US006609480B2

(12) **United States Patent**
Daniels et al.

(10) **Patent No.: US 6,609,480 B2**
(45) **Date of Patent: Aug. 26, 2003**

(54) **SQUEEZE CHUTE APPARATUS**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **10/057,058**

(22) Filed: **Jan. 25, 2002**

(65) **Prior Publication Data**

US 2003/0140870 A1 Jul. 31, 2003

(51) **Int. Cl.**[7] **A01K 15/00**
(52) **U.S. Cl.** **119/752**
(58) **Field of Search** 119/752, 751; A01K 15/00

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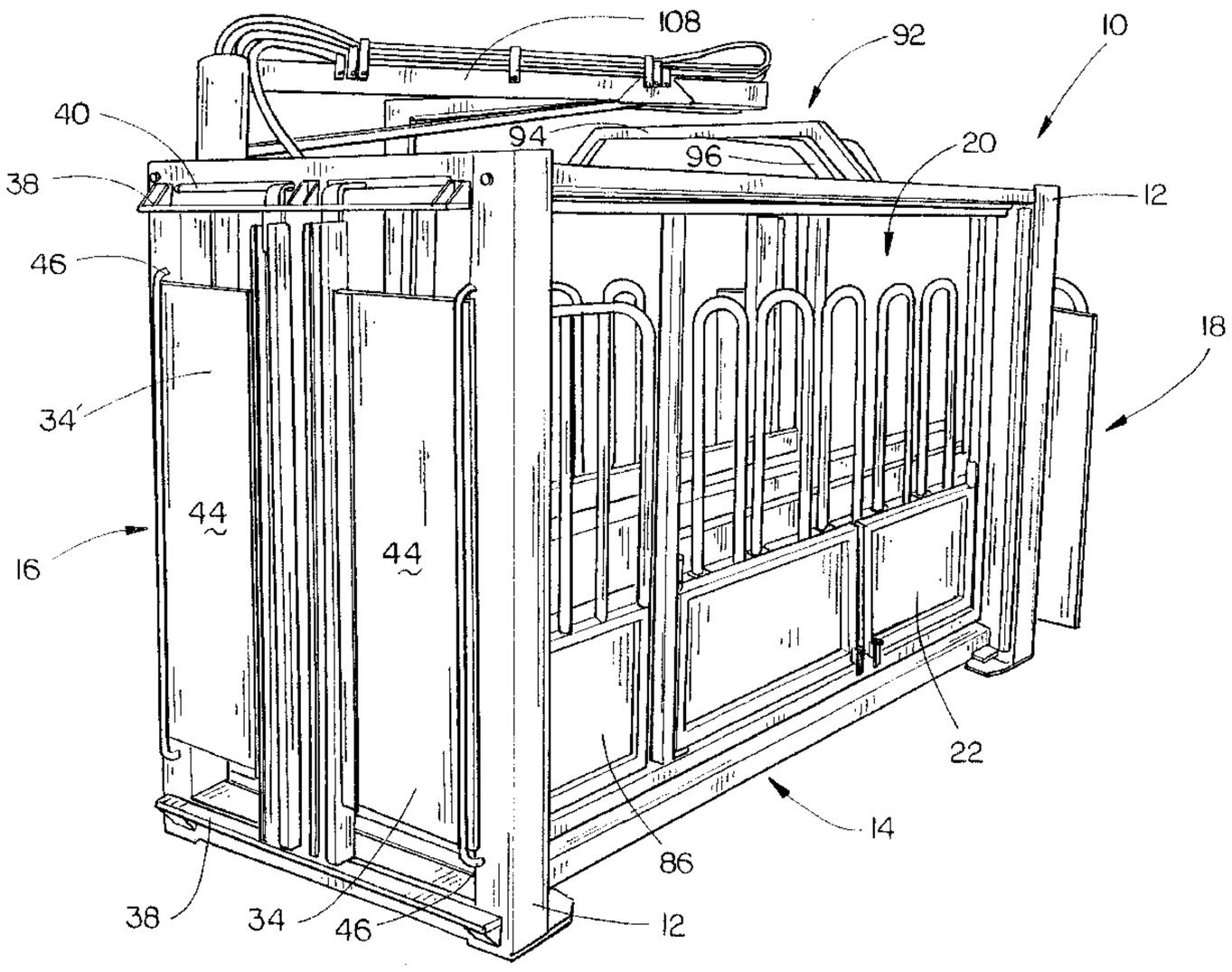
(57) **ABSTRACT**

An improved portable squeeze chute apparatus includes a chute having an entrance end, an exit end, opposing sidewalls, a base and a frame. Each of the sidewalls has a plurality of openable and removable upper panels and openable lower panels for accessing upper portions and lower portions of an animal positioned in the chute. Each of the sidewalls is selectively positionable along a generally horizontal axis in order to immobilize lateral movement of an animal positioned in the chute. An exit gate is positioned at the exit end of the chute to prevent the animal from exiting forwardly from the chute. An entrance gate has interconnected entrance gate side portions for selectively preventing the animal from exiting rearwardly from the chute. Various portions of the apparatus are each controllable by a respective hydraulic chain drive assembly. One such portion includes a pair of arcably pivoting neck stretchers for selectively immobilizing the animal's head and neck while the animal is being worked. The controls for the hydraulically powered portions of the chute are disposed at the end of a pivotally mounted boom for easy control of the chute from any side of the chute. A removable and adjustable sternum support is also provided to safely support the animal while it is worked.

34 Claims, 18 Drawing Sheets



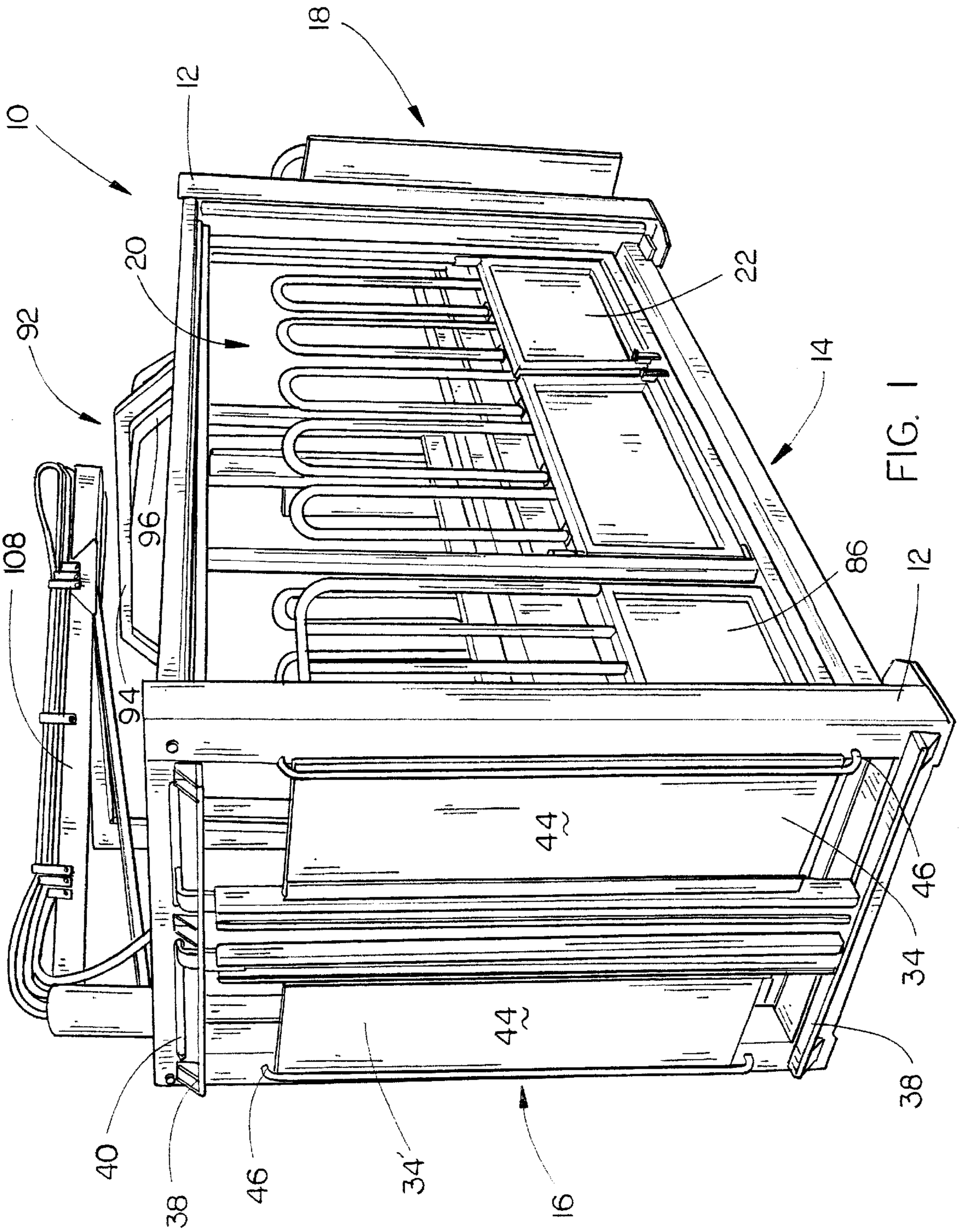


FIG. 1

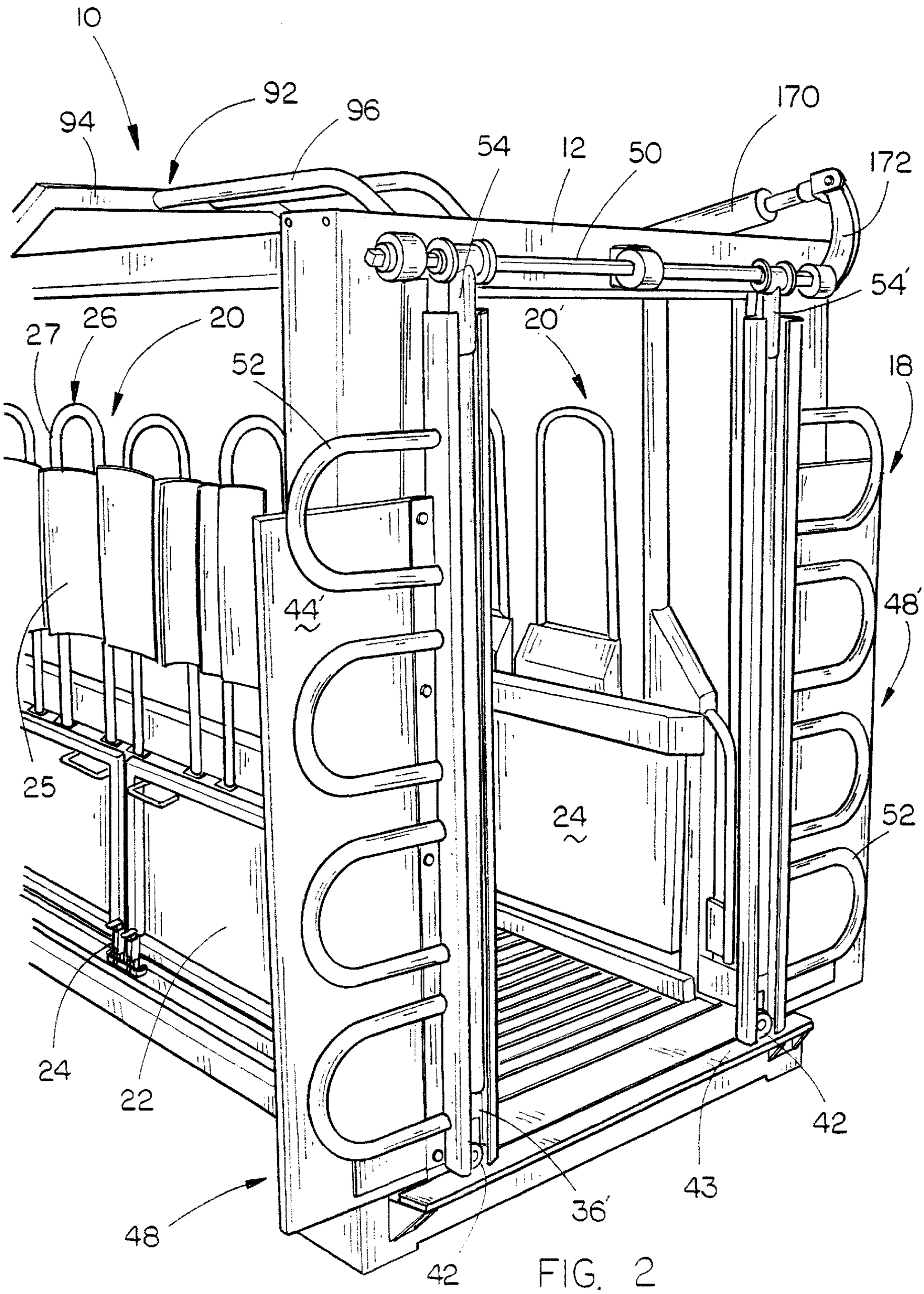

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FIG. 2

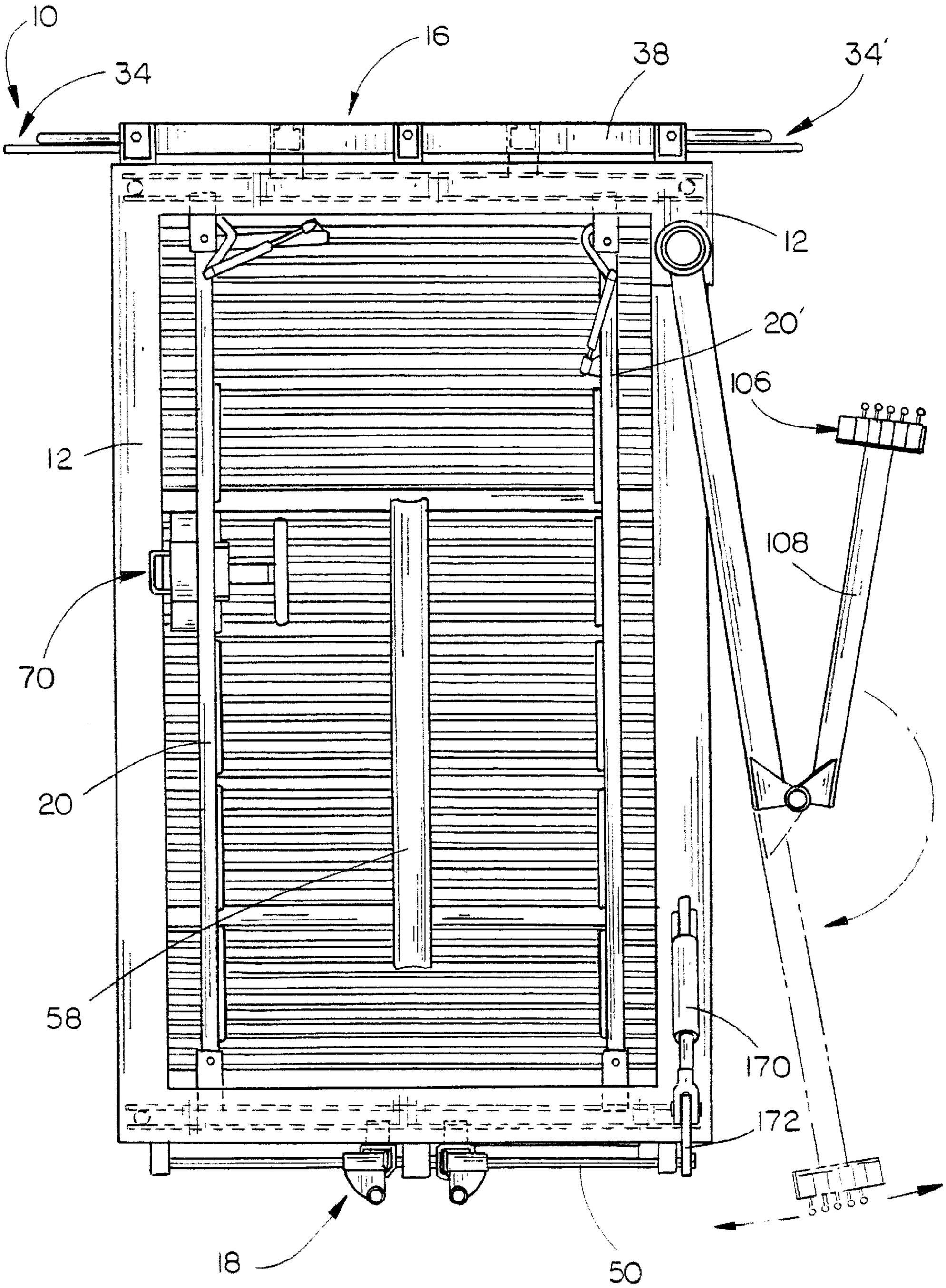

FIG. 3

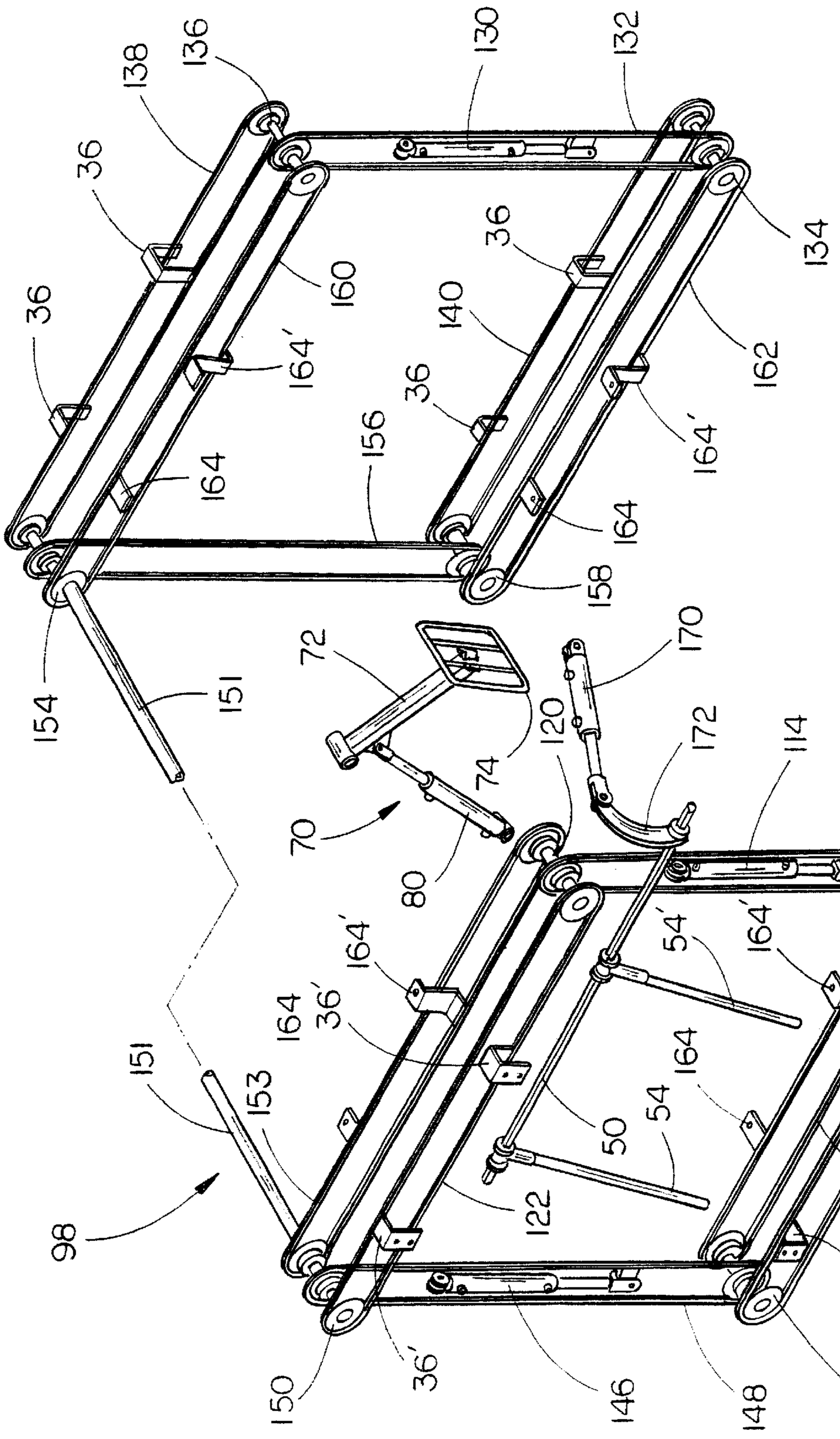
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FIG. 4

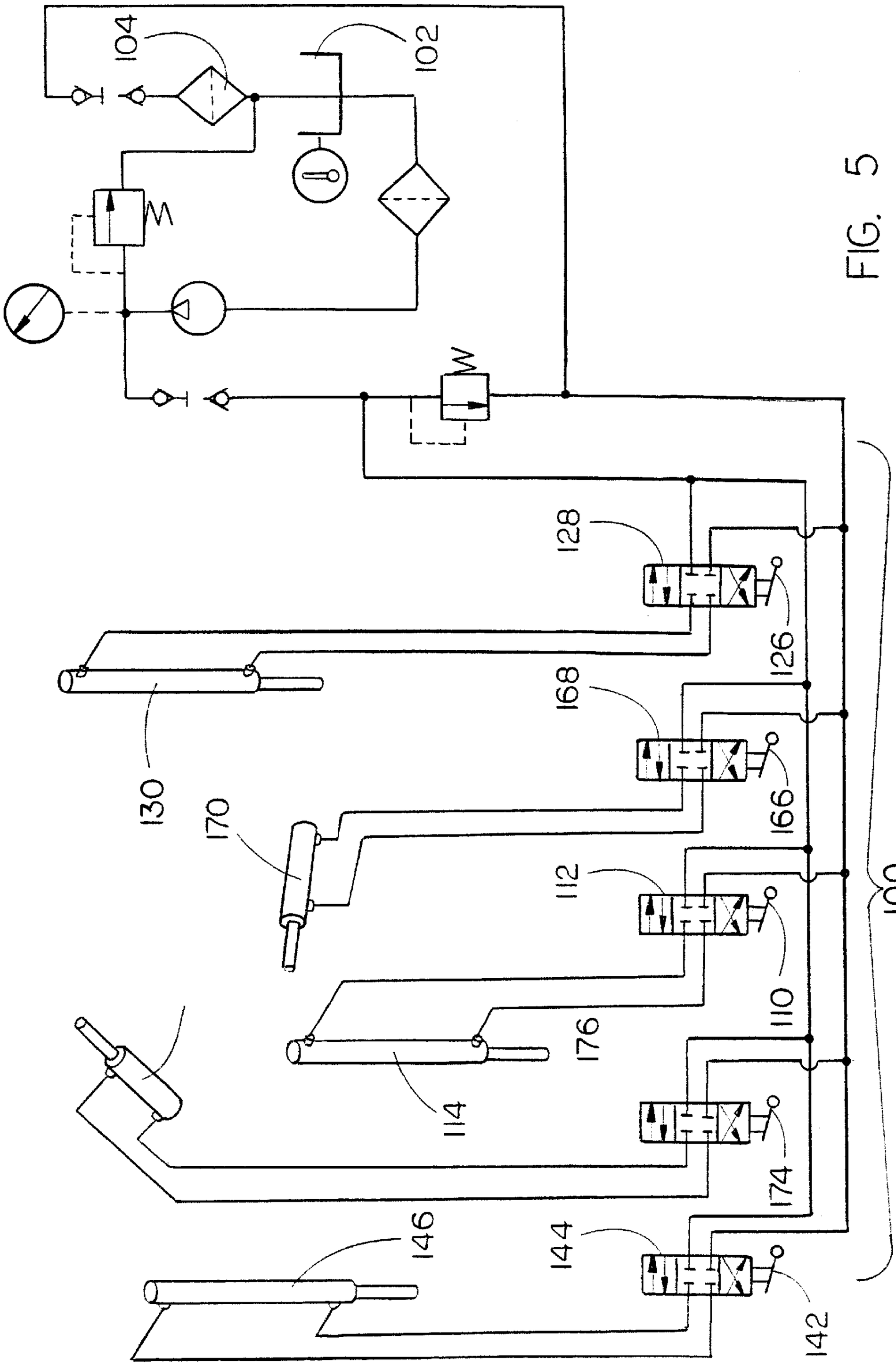
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FIG. 5

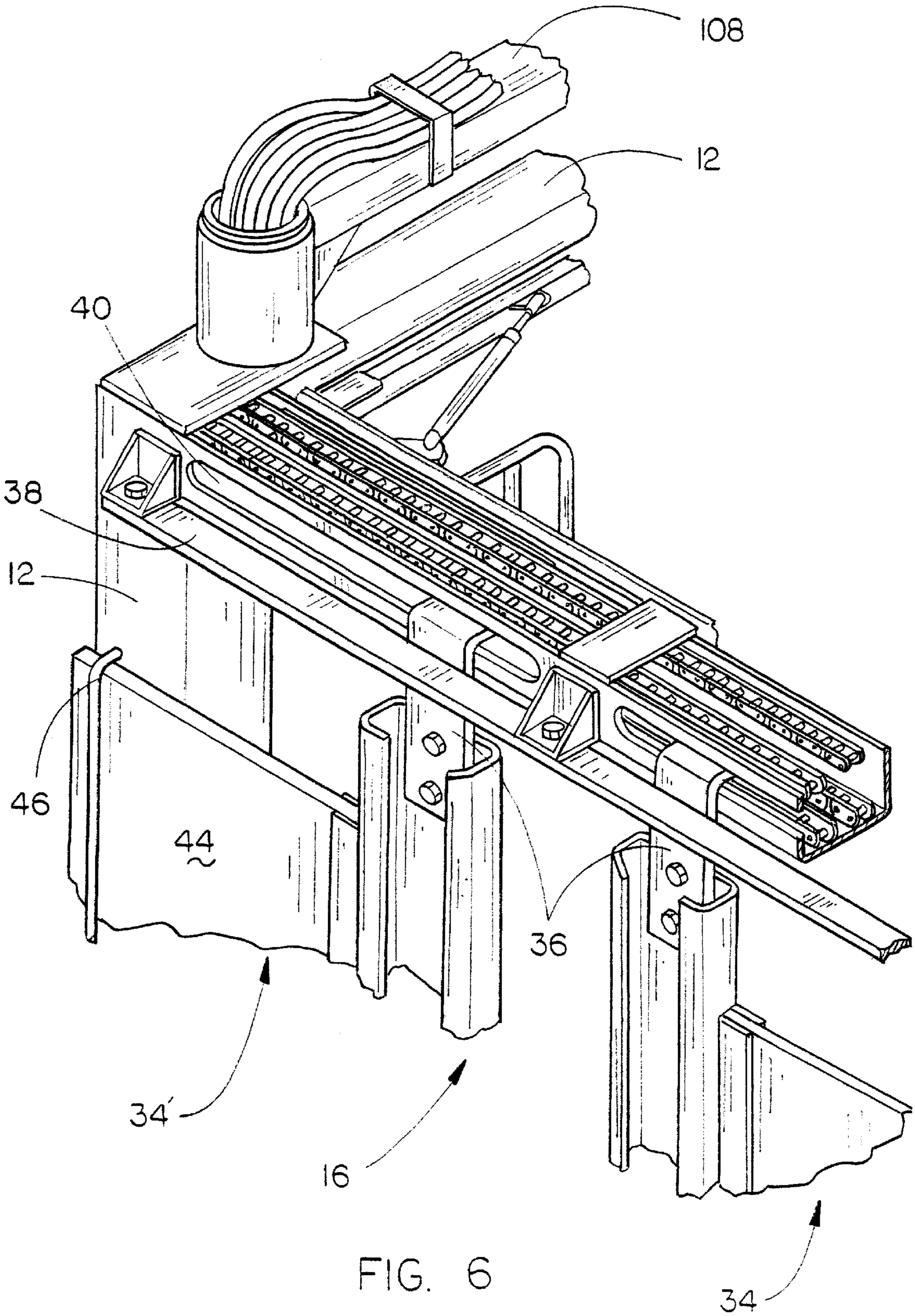


FIG. 6

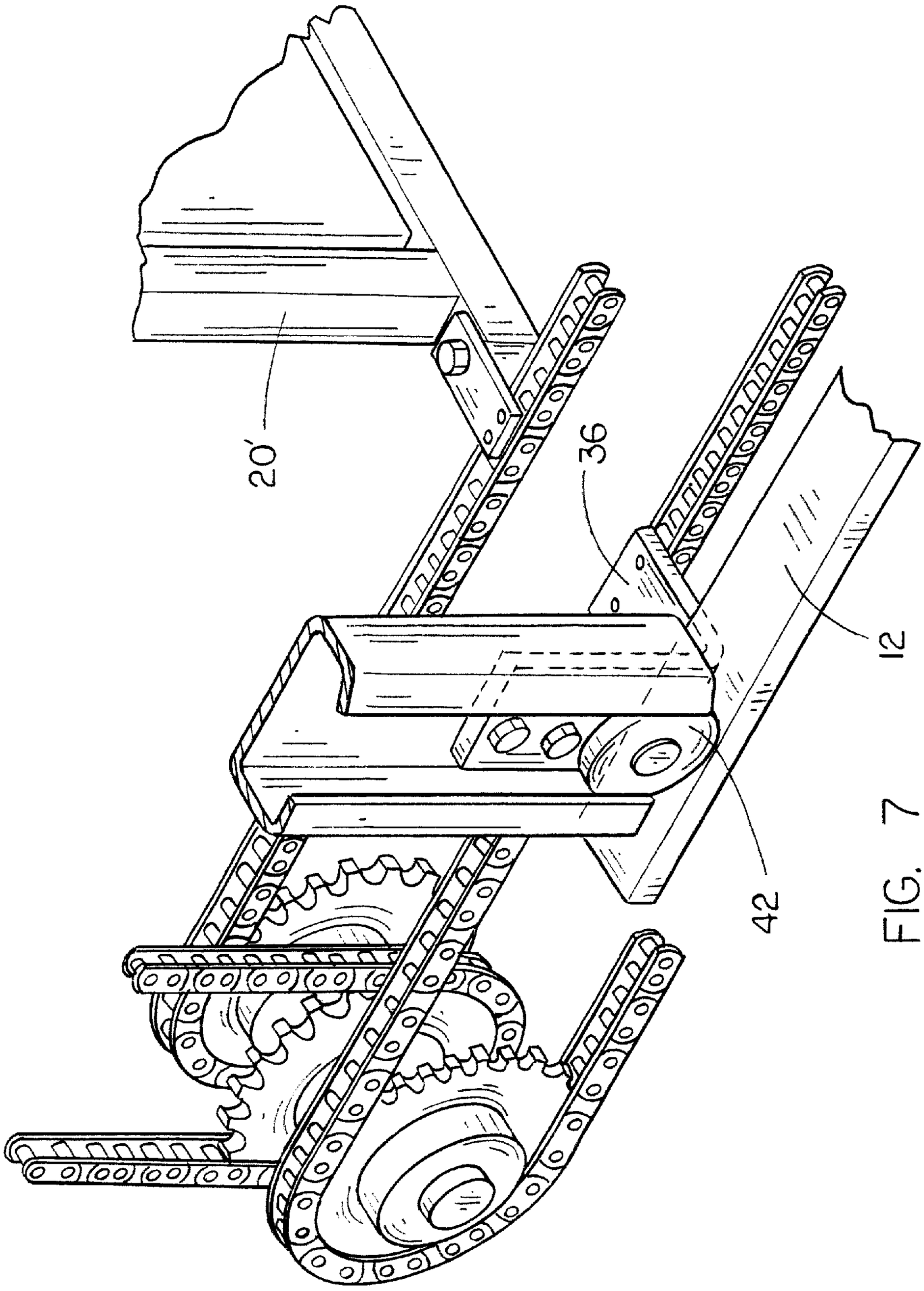


FIG. 7

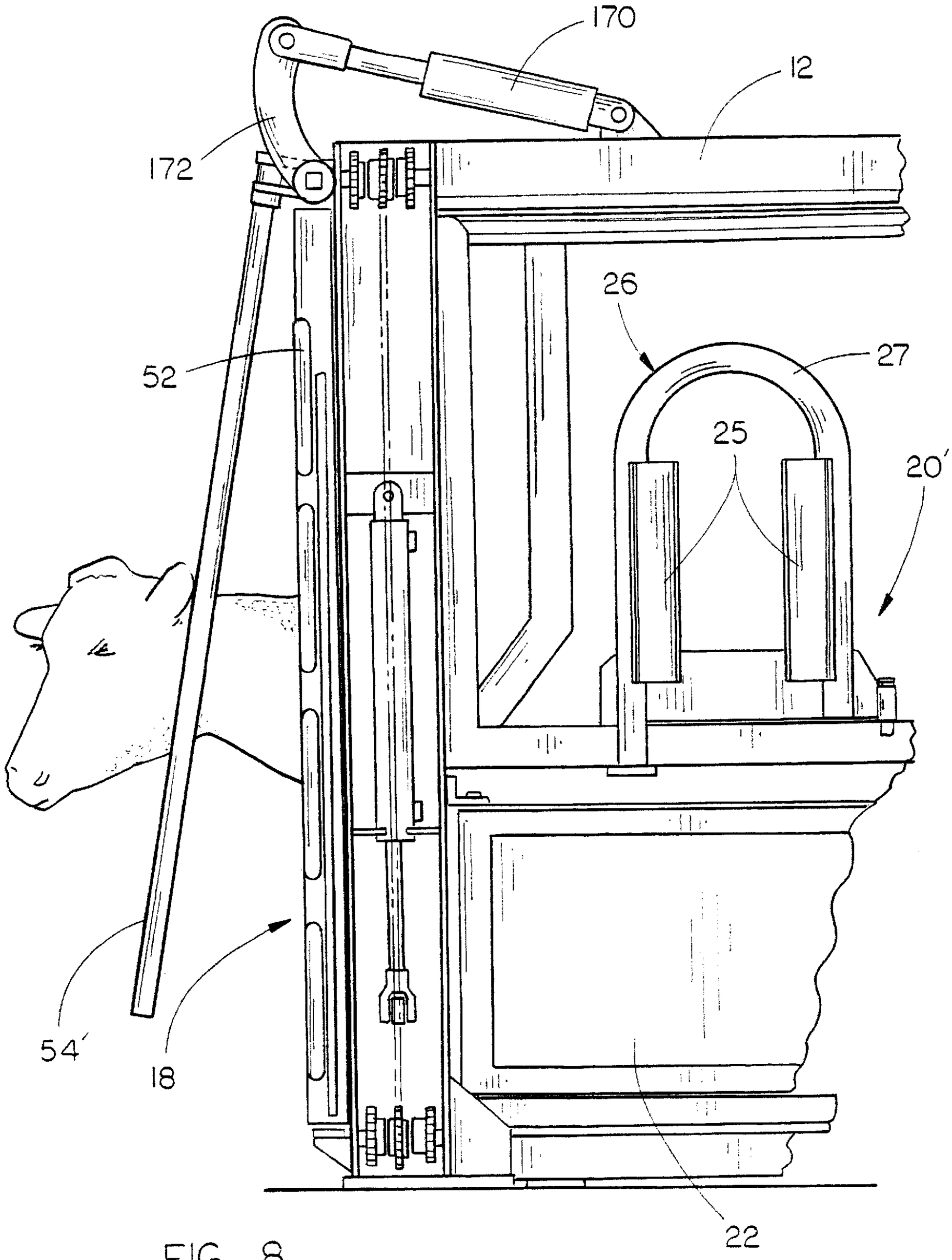


FIG. 8

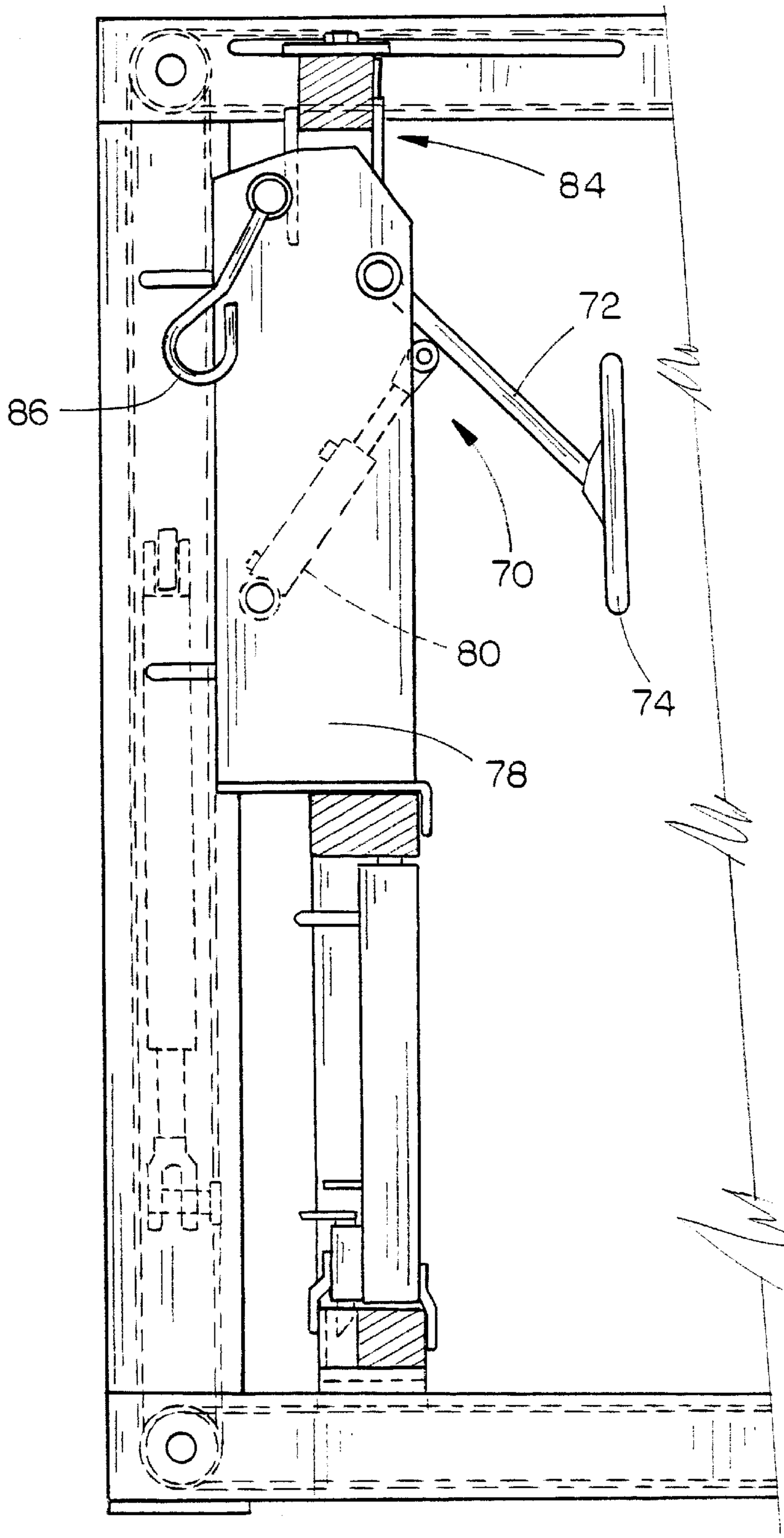


FIG. 9

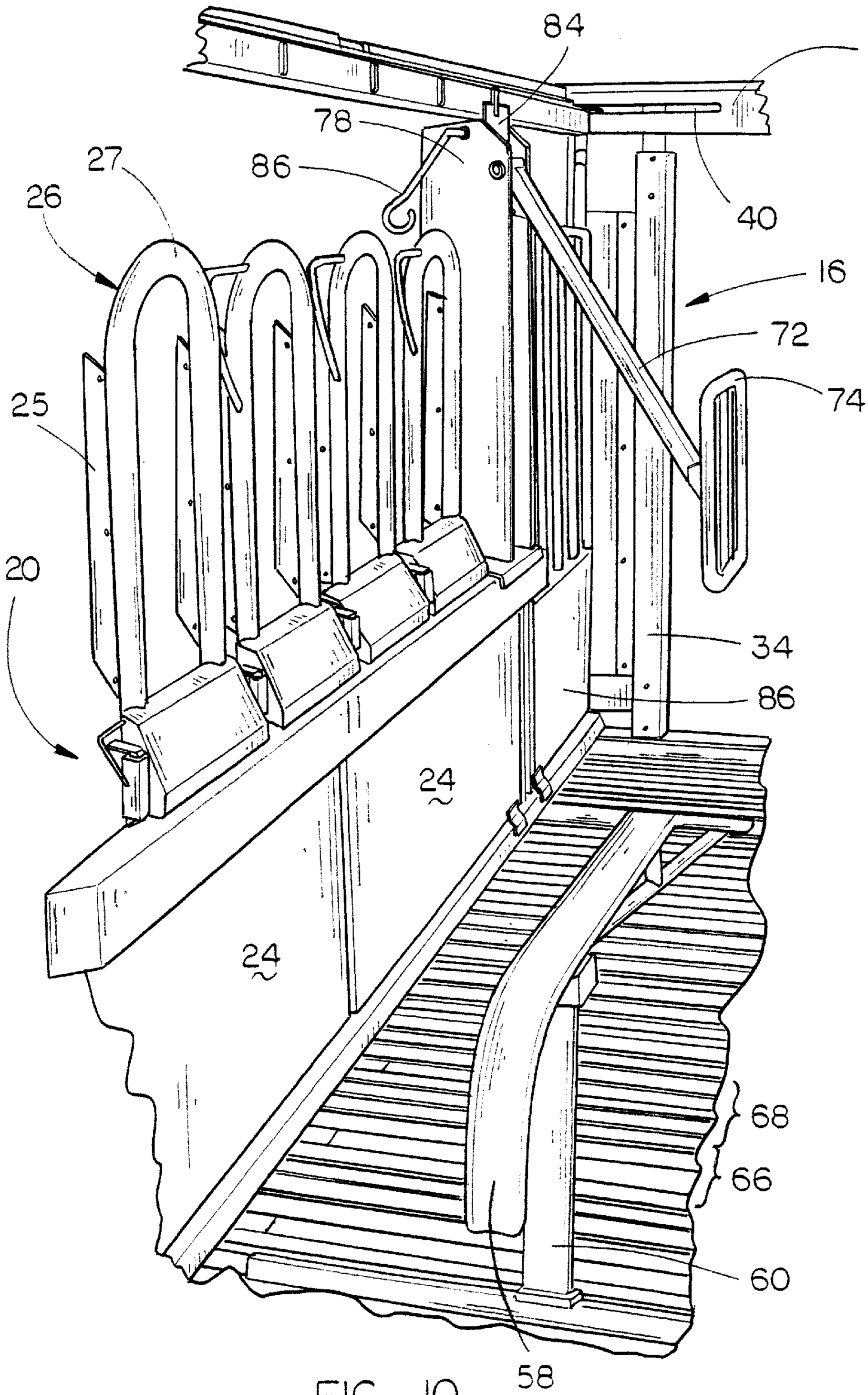


FIG. 10

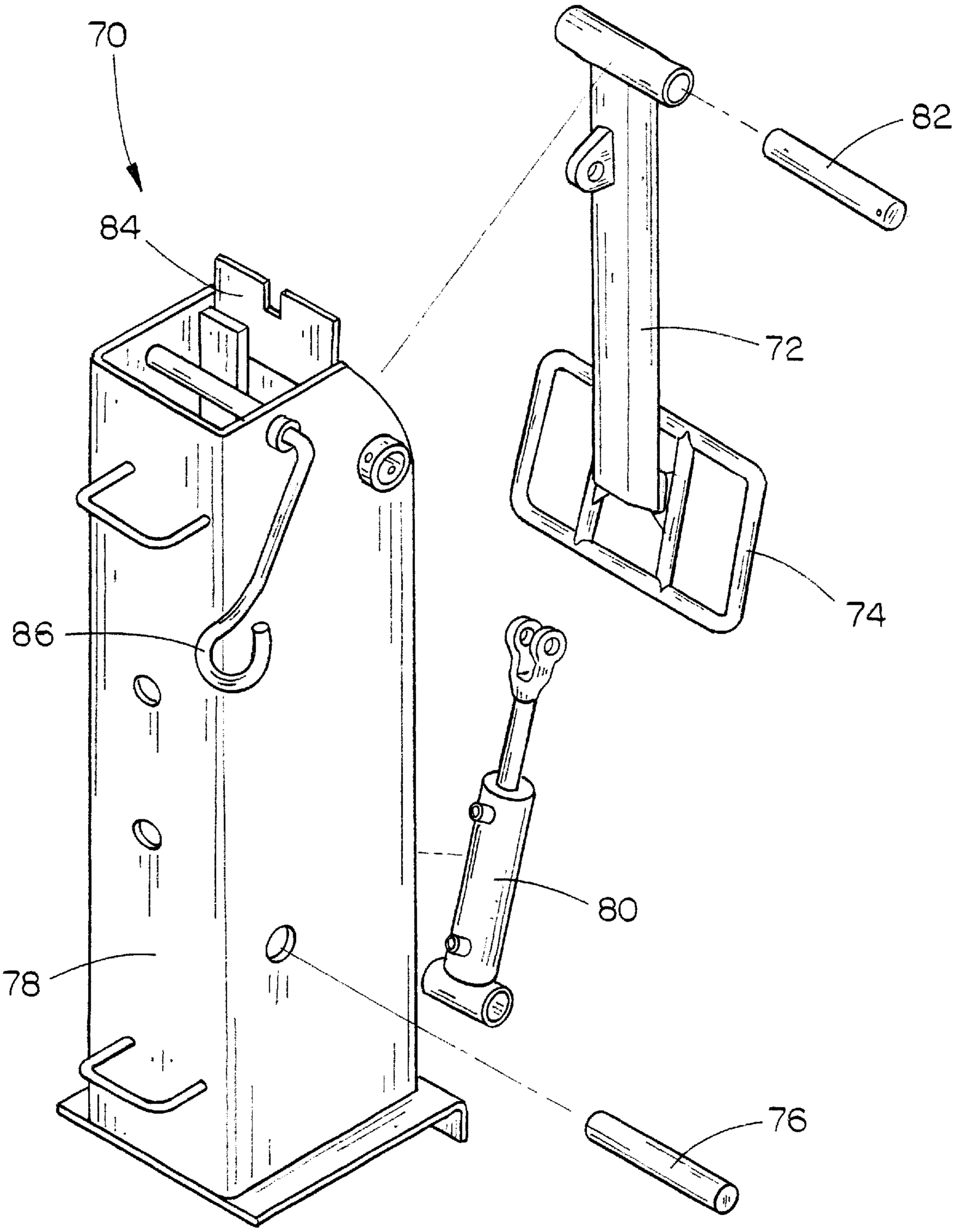


FIG. 11

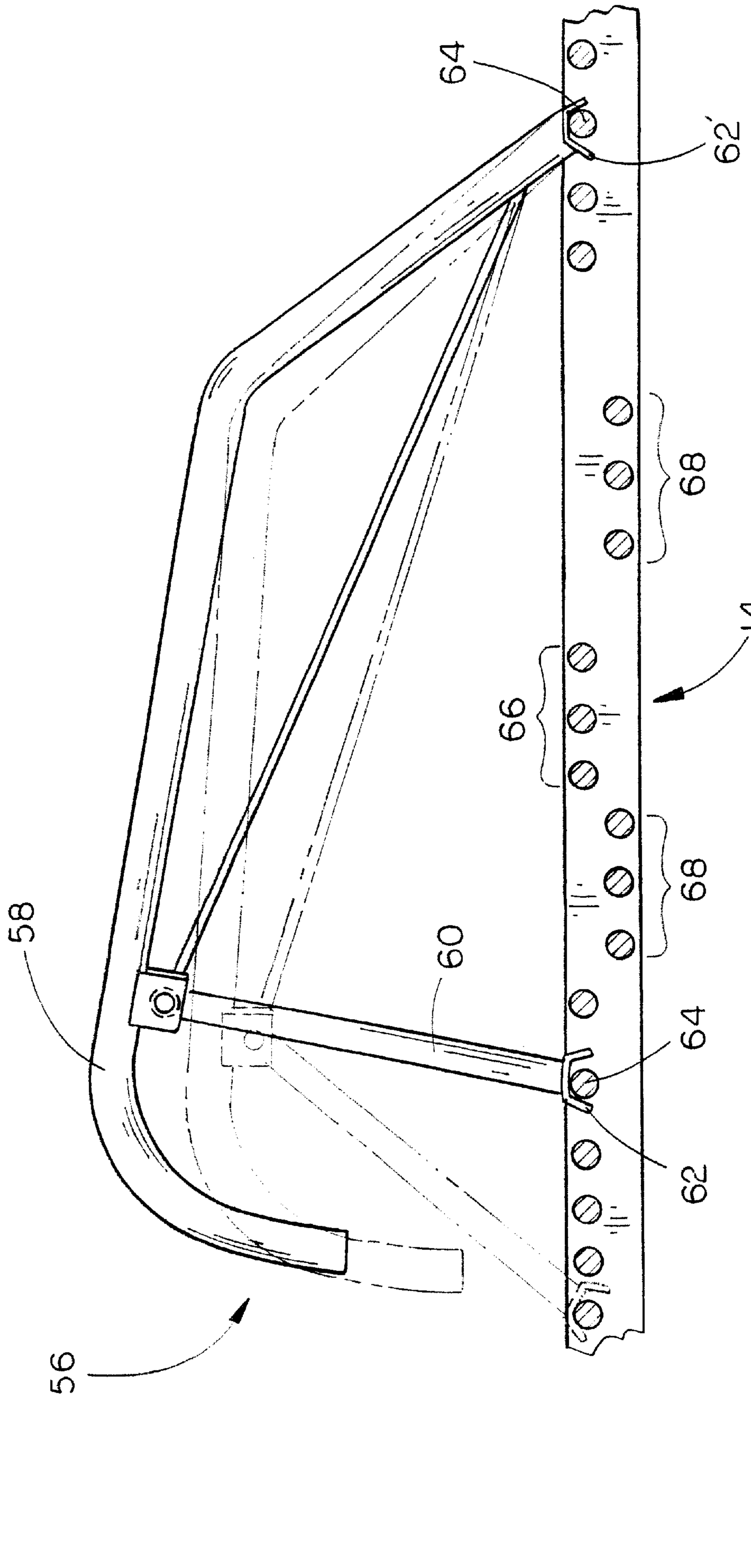
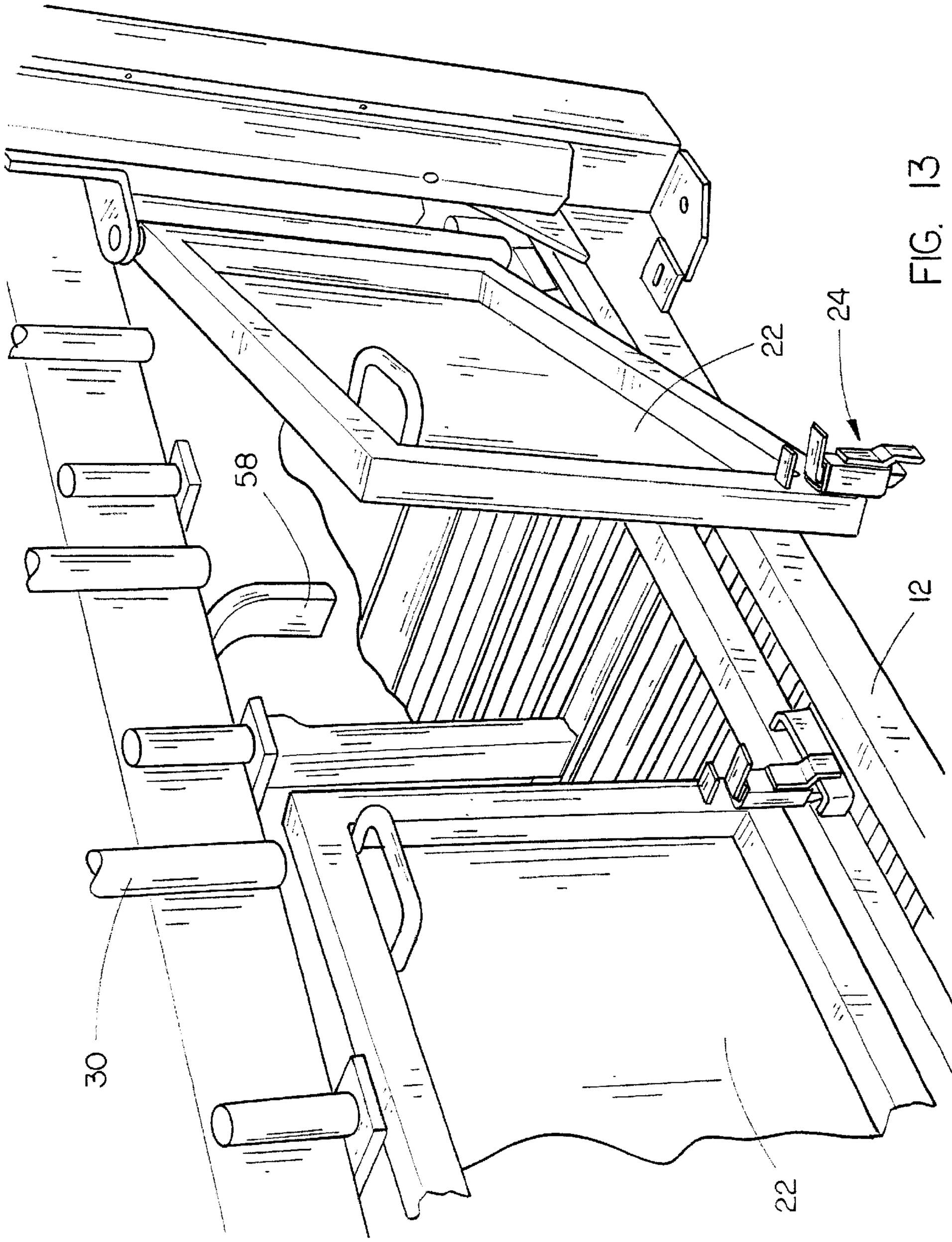


FIG. 12



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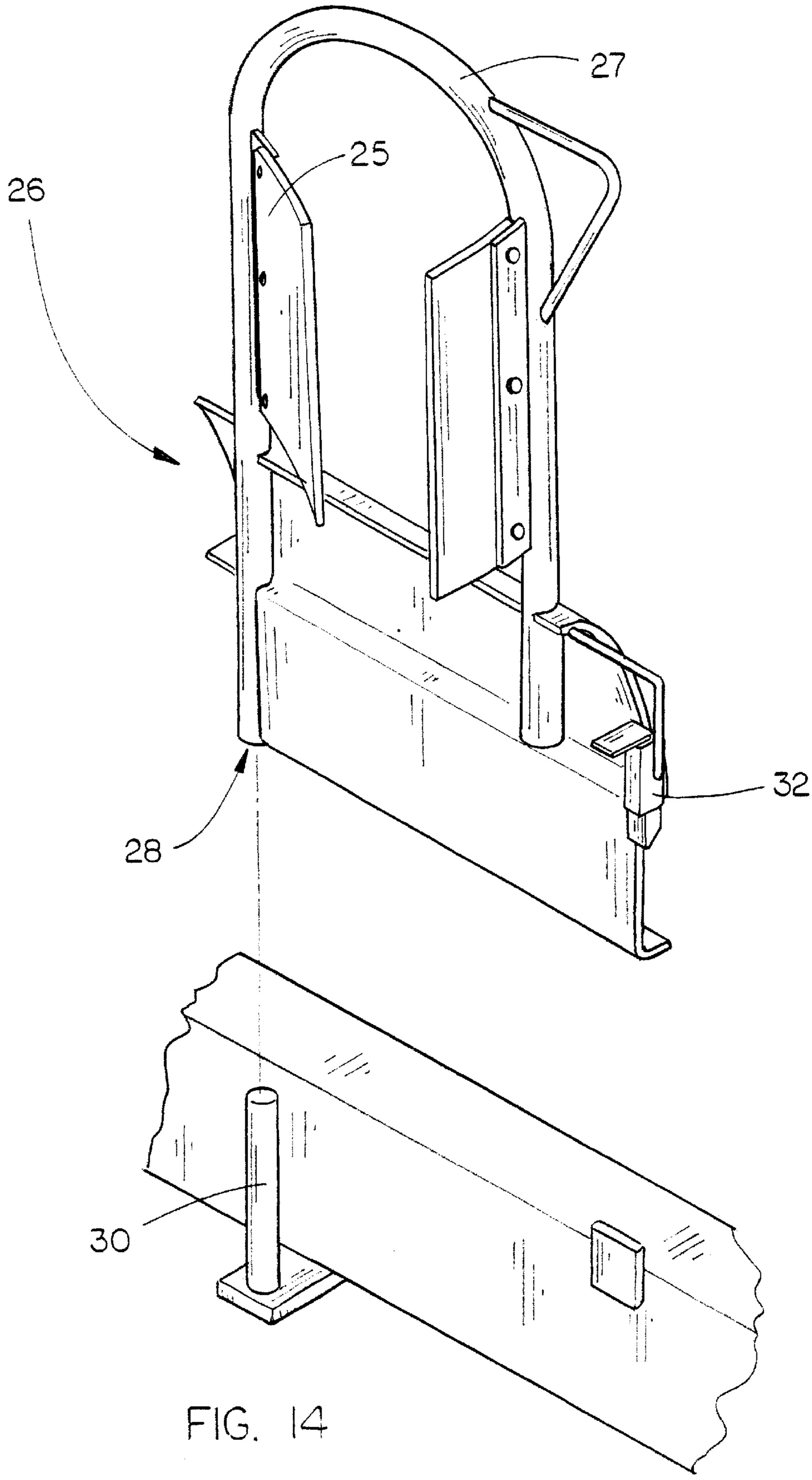
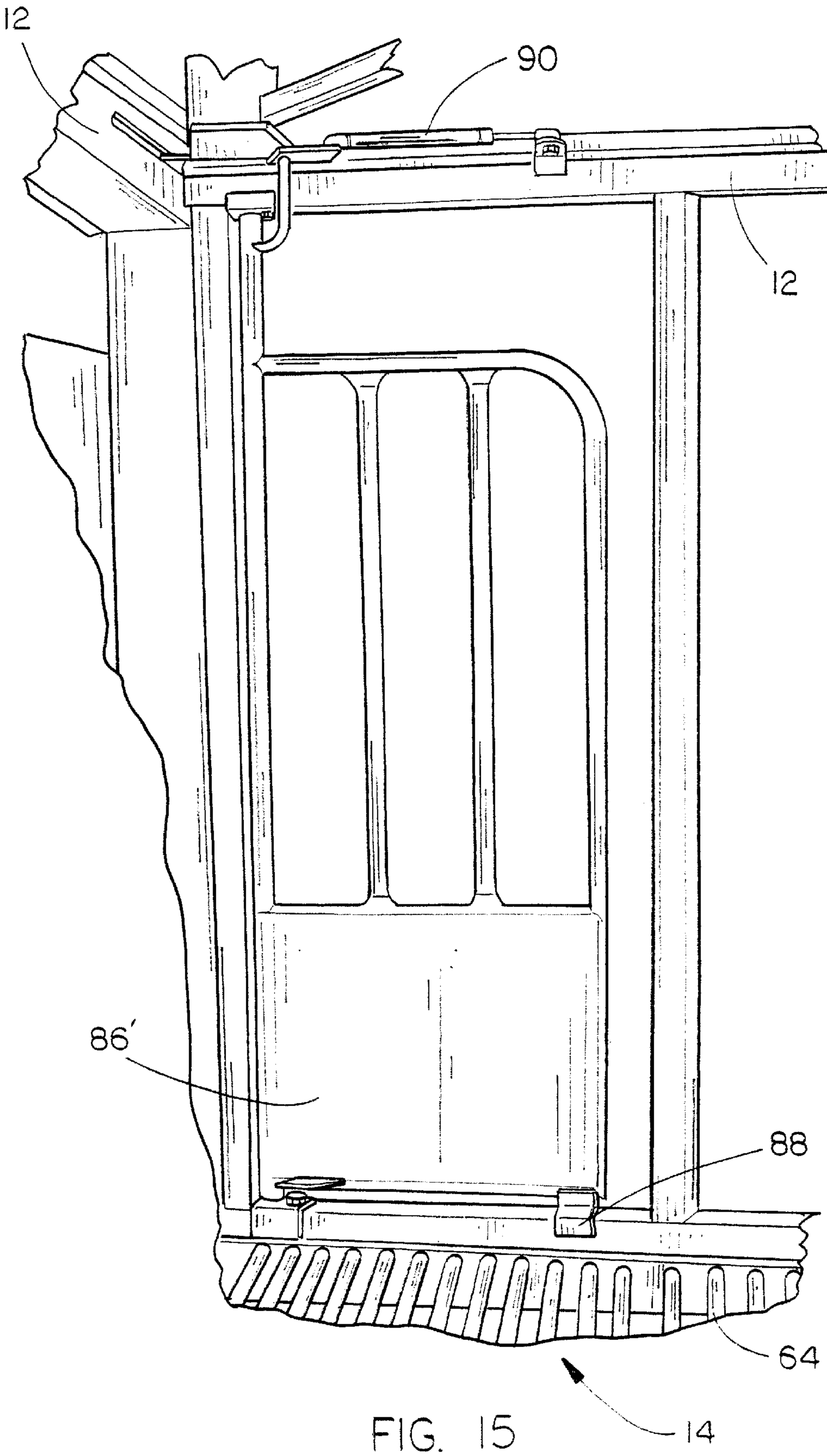


FIG. 14



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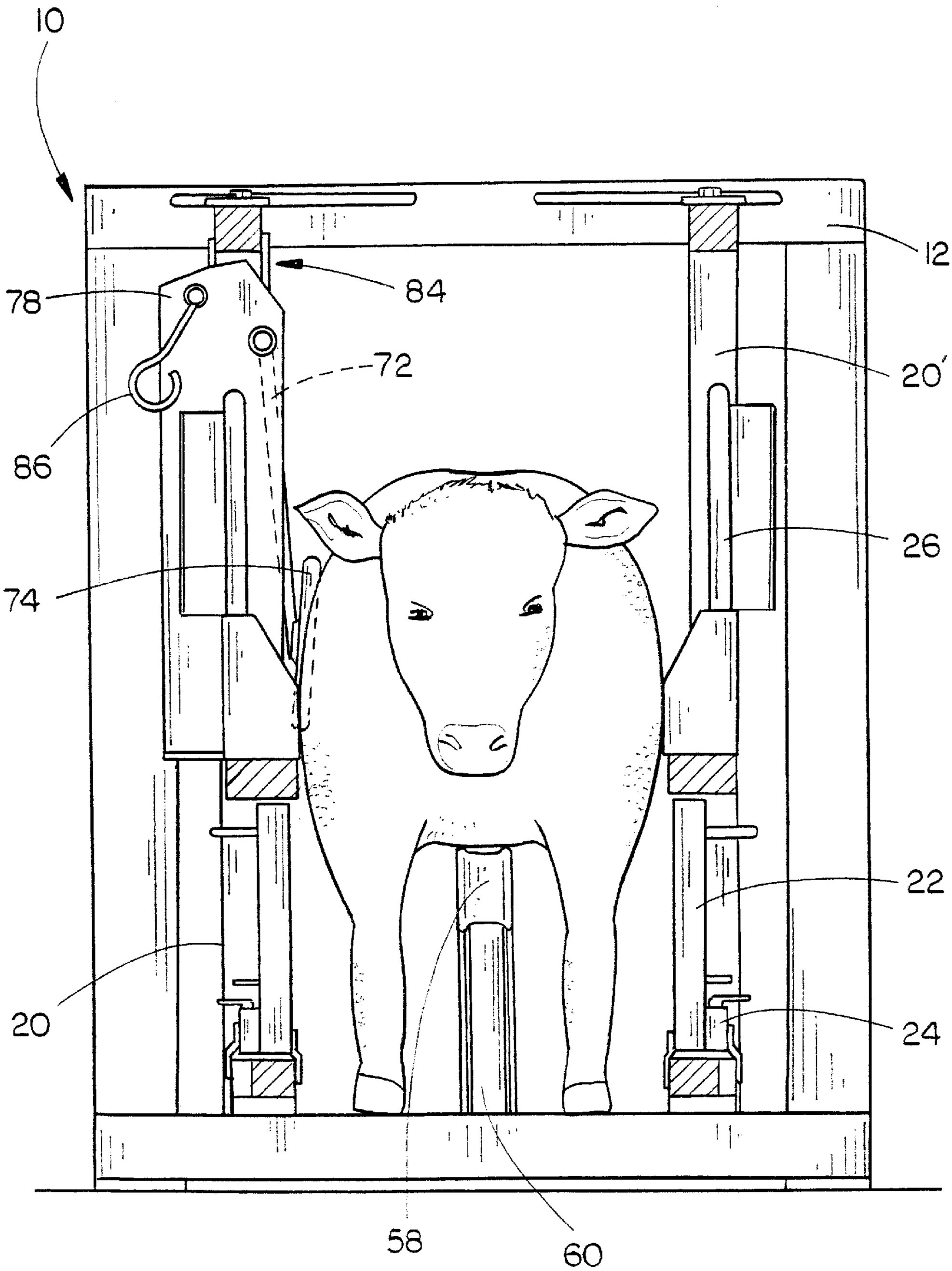

FIG. 16

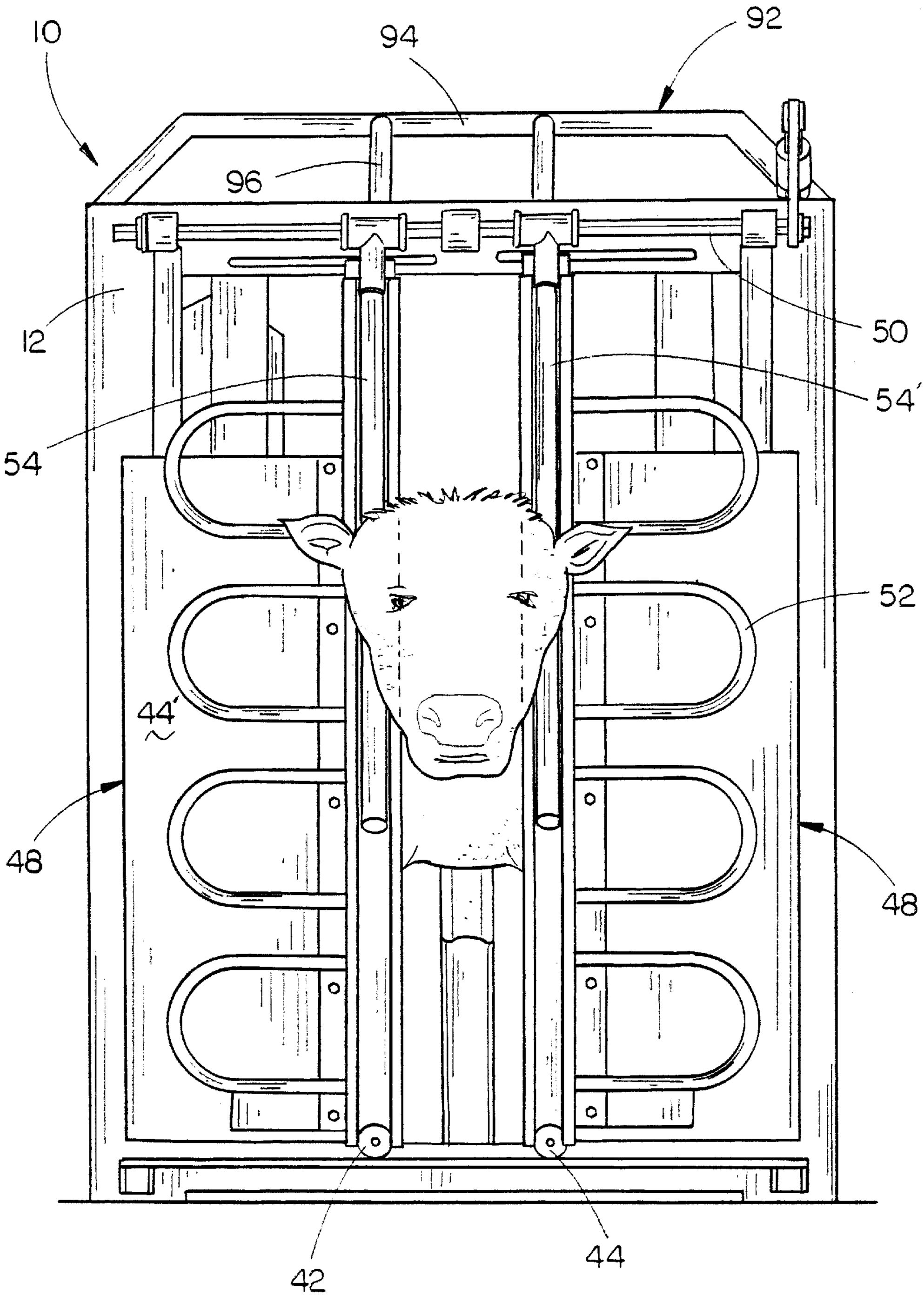

FIG. 17

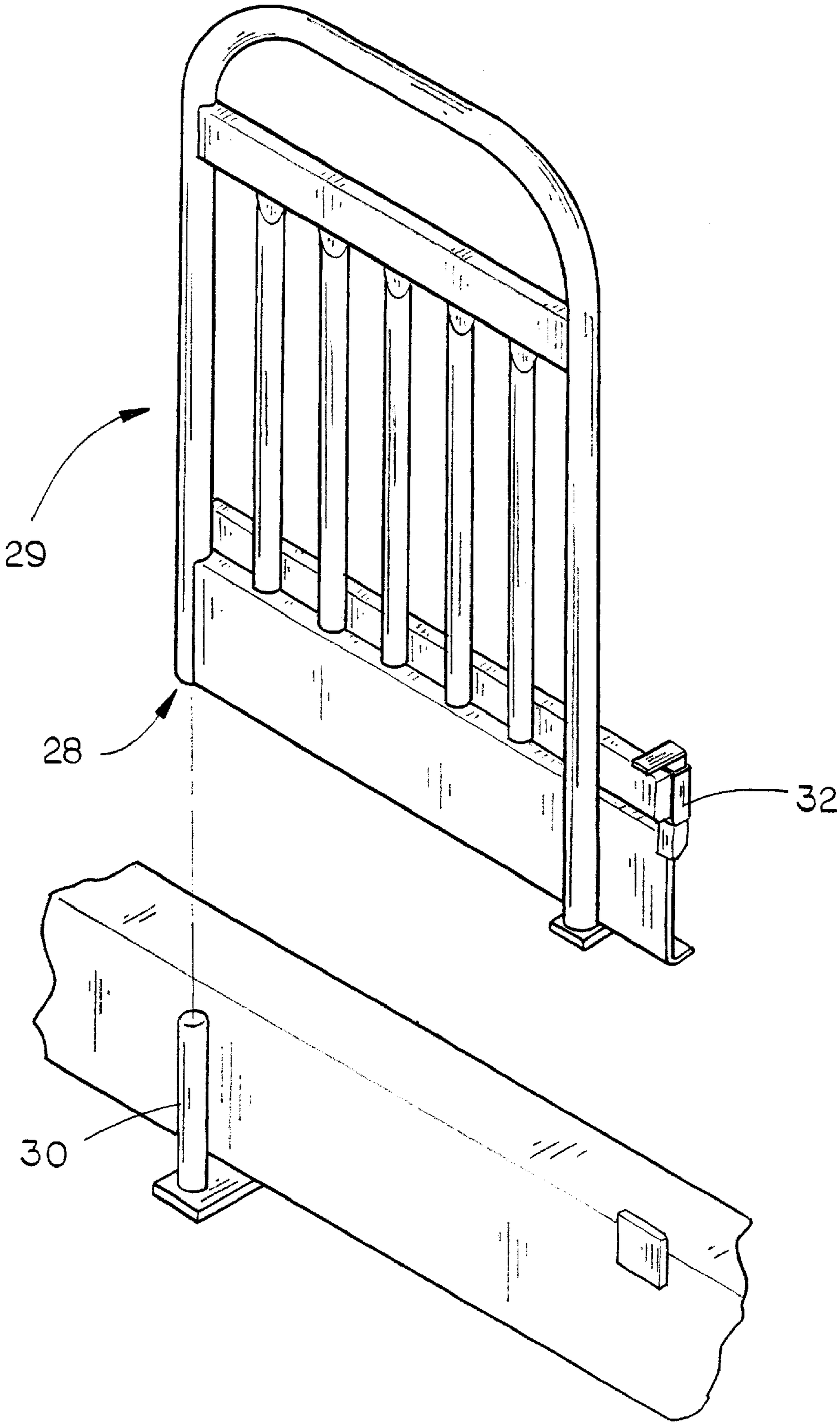

FIG. 18

SQUEEZE CHUTE APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to livestock handling equipment and more particularly to a squeeze chute for selectively immobilizing an animal in a standing position to safely allow any number of operations to be safely performed on the animal.

2. Description of the Prior Art

In livestock operations it is often necessary to restrain the animals for palpating, immunizing, branding, treating, weighing, loading, etc. Corrals, loading chutes, alleyways, pens, and the like, have heretofore been constructed and employed by livestock operators and veterinarians for these purposes. These structures are often constructed permanently from materials such as stone, barbed wire, wooden rails, steel pipe, and the like. However the capital investment required for such permanent structures is often prohibitive to ranchers having small operations, particularly those that operate their livestock on small isolated tracts of grazing land. Furthermore, many such ranchers lease, rather than own, their grazing land and naturally wish to avoid making permanent, fixed improvements.

A common solution to this problem is to physically transport the livestock to a remote location having the necessary equipment. However, transporting a herd of large animals tends to be relatively time-consuming and expensive. A round trip from the grazing pasture to a treatment facility requires loading, transporting, and unloading the animals twice. Naturally, the time and expense associated with transporting livestock increases with the distances and number of animals involved.

A disadvantage with many prior art portable animal handling devices is that large animals can be hazardous to workers trying to direct and control them with such equipment. Animals that are unaccustomed to confinement frequently balk at entering confining structures and may even panic. After being restrained, an animal may then suddenly begin kicking or attempt to climb up or back out of the chute. Many of the prior art animal-working structures provide little or no protection from such hazards.

Squeeze chutes can be provided with hydraulic power systems for opening and closing their gates and constricting and expanding their sidewalls to reduce or expand the size of the enclosure in which animals are received. Hydraulic power systems have the advantage of permitting control of the operable components from a single control station. However, these control systems are typically located in a fixed position at one end of the squeeze chute. This can limit the operator's view of the work being performed on the animal and typically limits the placement of the squeeze chute with respect to permanent structures located nearby.

Prior art squeeze chutes are usually provided with sides that pivot inwardly about their bottom ends in order to squeeze livestock. Since the distance between the sides at the bottom must conform substantially to the width of the animal, this type of chute requires adjustment in the spacing of the sides if both large and small animals are to be handled. It is also difficult for large animals to enter or be driven into the chute because its width at the bottom is barely sufficient to accommodate the animal. In addition, the manner in which the sides pivot tends to shock or excite the animal and often causes the animal to lose its balance. The construction

of the sides of existing squeeze chutes presents an additional problem in that the sides obstruct access to much of the animal's body, making examination and other operations on the animal difficult.

Another problem with many prior art squeeze chutes relates to the operation of their gates. Squeeze chute gates often include a pair of panels, which are pivotally mounted on the squeeze chute frame so that they traverse arcs when they are moved between their open and closed positions. This motion tends to swing the panels into the faces of the animals, contributing to the animal's stress and sense of distress.

During particular treatment operations, the head of the animal must be firmly held in place to avoid injury to both the animal and the operator. For example, the application of ear tags, implants or other medicaments in the animal's ear is accomplished more safely if the animal's head is substantially immobilized. The same is true during the examination of the animal's eyes, ears and teeth. It is further preferred that the animal's neck be fully exposed and nearly motionless when taking blood samples from or making injections of any kind of serum into the animal's neck.

The present methods of substantially immobilizing the animal's head all require substantial physical effort by the operator. Nearly all of the methods include use of a stanchion either fixed or formed as a part of a portable chute such as those used for de-horning. The animal is held in the stanchion to keep its body confined. Then, a tray or platform may be placed under the animal's head, which is pressed against the tray to hold it in place. An alternative prior art method uses fixed length arms, which extend outwardly from the stanchion gate. These arms are typically not adjustable and generally need to be used in combination with a nose ring and rope. If the animal becomes excited when this method is used, it is necessary for the operator to hold the head until the nose ring can be inserted and the rope tied before the desired operation can be carried out.

Prior art squeeze chute designs typically limit the operator's ability to safely enter the rearward end of the chute, behind the animal, without compromising the physical restraint of the animal. Furthermore, such prior art designs are incapable of selectively immobilizing the animal's hip area without increasing the transverse squeeze pressure exerted by the opposing sidewalls. Accordingly, even if the operator is able to enter the chute behind the animal, simple animal husbandry operations are made difficult if not dangerous.

As the animals are worked, some may have a tendency to lie down or even collapse under the surrounding conditions. Prior art squeeze chutes typically do not provide for a method of selectively and adjustably supporting the animal's abdomen. This not only increases the difficulty of working the animal but compromises the safety of the animal.

What is needed is an animal working apparatus that provides working accessibility to an animal confined therein while assuring relative safety and comfort for both the confined animal being worked and the operators who are working the animal.

SUMMARY OF THE INVENTION

The portable squeeze chute of the present invention is provided for restraining livestock during any number of operations, including branding, vaccinating, artificially inseminating, de-horning, or the like. The chute is generally comprised of a frame, an entrance gate, an exit gate, opposing sidewalls, and a base having adjustably removable

sections. The sidewalls are connected to the superstructure such that they are selectively positionable along generally horizontally oriented axis, which extend transversely to the chute. The sidewalls remain parallel as they move equidistantly toward one another to provide equal squeezing pressure to both sides of the animal.

Each of the opposing sidewalls is comprised of a plurality of lower panels, which are pivotable about generally vertical axis at the lower extremity of each sidewall to provide access to the lower portions of the animal. A lower panel latching mechanism selectively retains the lower panels in a closed configuration. The lower panels have planar inner surfaces to avoid providing footholds for an animal positioned in the chute.

The opposing sidewalls are each further comprised of a plurality of removable upper panels, which are pivotable about a generally vertical axis between open and closed positions. The upper panels provide access to the upper portions of an animal positioned in the chute. Upper panel latching mechanisms selectively retain the upper panels in their closed configurations.

The entrance gate has a pair of cooperating entrance doors, which are interconnected so that they synchronously slide along a generally horizontal axis between open and closed positions. As the animal enters the chute, the entrance doors are closed to prevent the rearward movement of the animal. The exit gate is positioned opposite the entrance gate and is provided with opposing doors, which are adapted to selectively abut the sides of an animal's neck. The exit gate doors are interconnected such that they synchronously slide along a generally horizontal axis. When the exit gate is closed, the animal's forward and rearward movement is prevented and the animal can be safely worked. When the exit gate is opened, the animal's forward motion is no longer restrained and it is free to exit the chute.

A pair of elongated neck-stretchers are pivotally mounted adjacent the top portion of the exit gate. When the exit gate is in its closed position, the neck-stretchers can be selectively extended in an arcing direction to engage the lower rearward portion of the animal's head to immobilize the same.

A hip-immobilizing arm is provided for selectively restraining the hip area of the animal. Once the hip area of the animal is restrained, the operator can enter the squeeze chute through one of two rear doors that are mounted to the frame of the chute between the entrance gate and each of the opposing sidewalls. In this position, the operator can safely perform several procedures at the rear of the animal.

A hydraulically powered, roller chain assembly is provided for mechanically operating the opposing sidewalls, the entrance and exit gates, the neck-stretchers and the hip-immobilizing arm. A central control station is provided, which allows a single person to easily operate the squeeze chute. The control station is disposed at the end of a pivotally mounted boom to allow the operator to control the chute from nearly any position around the chute.

An elongated abdomen support is removably secured to the floor of the squeeze chute, between its entrance and exit ends. The abdomen support prevents the animal from laying down while it is being worked. The height of the abdomen support is adjustable to accommodate different sized animals.

It is one of the important objects of the present invention to provide an improved livestock squeeze chute which includes upright sides that remain parallel at all times and are moved equidistantly toward one another to squeeze the animal equally from each side.

Another important object of the invention is to provide a squeeze chute which is able to accommodate both large and small animals without the necessity of structural changes or adjustments.

An additional object of the invention is to provide a squeeze chute in which both the squeeze and release functions of the chute can be fully operated easily and rapidly by a single man from either side of the chute.

A further object of the invention is to provide a squeeze chute having side doors to provide the operator with easy access to the interior of the chute behind the restrained animal.

An additional object of the invention is to provide a squeeze chute having easily openable and removable panels and doors on the sides to facilitate access to the entire body of the animal.

A further object of the invention is to provide a squeeze chute having structure that prevents the restrained animal from climbing out the top end of the squeeze chute.

An additional object of the invention is to provide a squeeze chute having a removable abdomen support that is adjustable in height to accommodate animals of different height.

A further object of the invention is to provide a squeeze chute having removable floor panels.

An additional object of the invention is to provide a squeeze chute having floor panels that are comprised of a plurality of horizontally and vertically spaced traction steps.

A further object of the invention is to provide a squeeze chute having a device for selectively restraining the hip area of the animal.

An additional object of the invention is to provide a squeeze chute wherein the restraining functions are hydraulically powered to allow a single operator to restrain the selected animal.

A further object of the invention is to provide a squeeze chute having a hydraulically powered, roller chain assembly for easily and efficiently operating the restraining structures of the squeeze chute.

An additional object of the invention is to provide a squeeze chute that selectively restrains an animal while reducing the incidence of injury to the animal and operator alike.

These and other objects will be apparent to those skilled in the art.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a rear perspective view of the squeeze chute of the present invention;

FIG. **2** is a front perspective view of the exit gate of the squeeze chute in an open position;

FIG. **3** is a plan view of the squeeze chute of the present invention;

FIG. **4** illustrates the chain-drive system of the squeeze chute of the present invention;

FIG. **5** is a schematic of the hydraulic assembly of the squeeze chute of the present invention;

FIG. **6** is a partial perspective view of the entrance gate of the squeeze chute of the present invention and the associated upper horizontal chain-drive assembly;

FIG. **7** is a partial perspective view of a lower horizontal chain-drive assembly of the squeeze chute of the present invention;

FIG. **8** is a side view of the neck extender of the squeeze chute of the present invention in an extended position;

FIG. **9** is a side view of the hip immobilizer of the squeeze chute of the present invention in an extended position;

FIG. **10** is a front perspective view of the interior of the squeeze chute of the present invention;

FIG. **11** is an exploded view of the hip immobilizer of the squeeze chute of the present invention;

FIG. **12** is side elevation view of the abdomen support of the squeeze chute of the present invention;

FIG. **13** is a perspective view of the lower side doors of the squeeze chute of the present invention;

FIG. **14** is a perspective view of an upper sidewall door of the squeeze chute of the present invention and an associated mounting pin;

FIG. **15** is a side elevation view of a rear access door of the squeeze chute of the present invention;

FIG. **16** is a front elevation view of the squeeze chute of the present invention illustrating the operation of the hip immobilizing arm;

FIG. **17** is front elevation view of the exit gate of the squeeze chute of the present invention in a closed immobilizing position; and

FIG. **18** is a perspective view of an alternate embodiment of an upper sidewall door of the squeeze chute of the present invention and an associated mounting pin.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A squeeze chute **10** for working livestock, shown in FIGS. **1–3**, **8**, **16** and **17**, is generally provided with a frame **12** having upper and lower ends and entrance and exit ends. An elongated, generally horizontal base **14** is connected to the frame **12**, closely adjacent the lower end thereof, and extends between the entrance and exit ends of the chute **10**. An entrance gate **16** is operatively secured to one end of the base **14** and is adapted to selectively slide in a transverse manner, between open and closed positions. An exit gate **18** is operatively secured to the opposite end of the base **14** and is also adapted to slide in a transverse manner, between open and closed positions. Opposing sidewalls **20** and **20'** are provided between the entrance gate **16** and exit gate **18**.

Opposing sidewalls **20** and **20'** are operatively secured to the frame **12**, intermediate its entrance and exit ends. Sidewalls **20** and **20'** are selectively positionable along a generally horizontal axis, which extends transversely to the chute **10**, for immobilizing the lateral movement of the animal within the chute **10**. The sidewalls **20** and **20'** remain parallel and substantially vertical as they move equidistantly toward one another to provide equal squeezing pressure to both sides of the animal.

Opposing sidewalls **20** and **20'** are substantially similar in structure. Accordingly, only sidewall **20** will be structurally described herein. Sidewall **20** is generally rectangular in shape, having upper and lower ends and opposite sides. A plurality of horizontally spaced lower panels **22** are provided adjacent the lower end of sidewall **20**, as illustrated by FIG. **13**. Each lower panel **22** is manually pivotable about a generally vertical axis between open and closed positions to provide access to lower portions of the animal. A latch **24** is provided for selectively securing each lower panel **22** in their respective closed positions. The lower panels have planar inner surfaces **24** to avoid providing footholds for an animal positioned in the chute in the event that the animal attempts to exit the chute.

A plurality of horizontally spaced upper panels **26** are provided adjacent the upper end of sidewall **20**, as illustrated by FIGS. **1**, **10** and **14**. The upper panels **26** are each generally comprised of an inverted, vertically oriented, U-shaped bar **27**, which allows individuals working an animal positioned in the chute to remain outside the chute and reach the upper portions of an animal positioned in the chute. Flexible panels **25** are secured to each of the U-shaped bars **27** to cover the openings therein. It is preferred that only one side of the flexible panels **25** be secured to the U-shaped bars **27** to permit the operator to selectively move the panels aside and reach through the U-shaped bars **27**. It is contemplated that one or more flexible panels **25** can be used with each U-shaped bar **27**.

The lower ends of the U-shaped bars **27** have openings **28** formed therein, which are adapted to removably receive elongated mounting pins **30**. The mounting pins **30** are secured to the sidewall **20** and extend generally vertically therefrom, so that each upper panel **26** can be removably secured to the sidewall **20**. The upper panels are pivotable about the generally vertical axis of mounting pins **30** between open and closed positions. Each upper panel **26** is provided with a latch **32** to selectively retain the upper panels **26** in their respective closed configurations. The upper panels **26** thus selectively provide manual access to the upper portions of an animal positioned in the chute.

In an alternate embodiment, shown in FIG. **18**, the opposing sidewalls **20** and **20'** could be provided with one or more upper panels **29**. Preferably, the upper panels **29** are secured to the mounting pins of opposing sidewalls **20** and **20'** in a manner similar to that of panels **26**. Panels **29** primarily differ from panels **26** in that panels **29** are wider than panels **26** so that, when the panels **29** are secured adjacent to the exit end of chute **10**, greater access is given to the animal's shoulder area for such procedures as vaccinations and the like. Due to the increased width of the U-shaped frame of panel **29**, it is preferred that the opening formed therein be filled or covered with a plurality of rigid bars **31**, rather than a single flexible panel **25**. However, it is contemplated that a combination of rigid bars **31** and flexible panels **25** could be used to fill the opening. The panels **29** open and close in a manner similar to the panels **26** and are selectively latched to the opposing sidewalls **20** and **20'** to prevent the panel **29** from freely opening due to movement by the animal.

An entrance gate **16** is provided at the entrance end of the chute **10**, as illustrated by FIGS. **1**, **3** and **6**. Entrance gate **16** is selectively movable between open and closed positions to allow the animal to enter the chute **10** and prevent it from exiting rearwardly therefrom. The entrance gate **16** is generally comprised of a pair of cooperating entrance doors **34** and **34'**, which are interconnected so that they synchronously slide equally along a generally horizontal axis between the open and closed positions.

The entrance doors **34** and **34'** are provided with upper and lower L-shaped tabs **36** for operatively, slidably connecting the upper ends of entrance doors **34** and **34'** to the upper end of frame **12**. Elongated, horizontally disposed brackets **38** retain the vertical portion of each tab **36**, while an elongated slot **40** operatively receives the horizontal portion of each tab **36**. The lower tabs **36** operatively and slidably connect the lower ends of entrance doors **34** and **34'** to the lower end of frame **12**. The bottom end of entrance doors **34** and **34'** are provided with a roller **42**, which is rotatably secured thereto. Rollers **42** operatively engage the lower portion of frame **12** to allow entrance doors **34** and **34'** to smoothly slide between their respective open and closed positions.

Entrance doors **34** and **34'** are further comprised of panels **44**, which form the majority of the front and back surface area of entrance doors **34** and **34'**. The opposite ends of panels **44** are operatively received by elongated, vertically disposed brackets **46**, which are secured to the sides of frame **12**. Brackets **46** help to guide entrance doors **34** and **34'** between their respective open and closed positions and prevent the longitudinal movement of entrance doors **34** and **34'** with respect to chute **10**.

An exit gate **18** is provided at the exit end of the chute **10**, as illustrated by FIGS. **2**, **3** and **17**. Exit gate **18** is selectively movable between open and closed positions to selectively permit and prevent at least the forward movement of the animal. The exit gate **18** is generally comprised of a pair of cooperating exit doors **48** and **48'**, which are interconnected so that they synchronously slide equally along a generally horizontal axis between the open and closed positions. The inner ends of exit doors **48** and **48'** serve as a neck clamp, which is adapted to selectively abut opposing sides of an animal's neck, as illustrated by FIG. **17**. In this closed position, the animal's forward and rearward movement is prevented and the animal can be safely worked.

The exit doors **48** and **48'** are provided with upper and lower L-shaped tabs **36'**, which are substantially similar in structure and function to those used on entrance gate **16**. The upper tabs **36'** operatively and slidably connect the upper ends of exit doors **48** and **48'** to the upper end of frame **12**. An elongated, horizontally disposed mounting shaft **50** (discussed in further detail below) retains the vertical portion of each tab **36'**, while an elongated slot **40'** operatively receives the horizontal portion of each tab **36'**. The lower tabs **36'** operatively and slidably connect the lower ends of exit doors **48** and **48'** to the lower end of frame **12**. The bottom end of exit doors **48** and **48'** are provided with a roller **42'**, which is rotatably secured thereto. Rollers **42'** operatively engage a platform **43** secured to the lower portion of frame **12** to allow entrance doors **48** and **48'** to smoothly slide between their respective open and closed positions.

Exit doors **48** and **48'** are further comprised of panels **44'**, which are structurally and functionally similar to panels **44** of entrance gate **16**, that form the majority of the front and back surface area of entrance doors **48** and **48'**. A plurality of vertically spaced, generally U-shaped members **52** are secured to the inner edges of exit gates **48** and **48'** and extend outwardly therefrom, adjacent the front surface of exit gate **48** and **48'**. U-shaped members **52** provide additional structural support to panels **44'** to restrict the forward movement of the animal.

Elongated neck-stretchers **54** and **54'** are pivotally, slidably secured to mounting shaft **50**, adjacent the top portion of the exit gate **18** and extend in a generally downward direction along the inner edges of exit doors **48** and **48'**. When the exit gate **18** is in its closed position, the neck-stretchers **54** and **54'** can be arcably pivoted between extended and retracted positions. As the neck stretchers **54** and **54'** extend, they engage the lower rearward portion of the animal's head and extend the same in an upward and outward direction to immobilize the animal's head in an operable position. Neck-stretchers **54** and **54'** can be secured to mounting shaft **50** so that neck-stretchers **54** and **54'** extend generally perpendicularly from the longitudinal axis of mounting shaft **50**, as shown in FIGS. **2**, **4** and **17**. In an alternate embodiment, however, mounting brackets **55** and **55'** are used to secure neck-stretchers **54** and **54'** to mounting shaft **50** so that, while neck-stretchers **54** and **54'** extend generally perpendicularly to mounting shaft **50**, they are offset a short distance "x" from the longitudinal axis of mounting shaft **50**. In this off-set position, the arc traversed by neck-stretchers **54** and **54'** is broadened somewhat. The distance "x" to which the neck-stretchers **54** and **54'** are off-set can be varied according to the breadth of arcing motion desired.

An elongated abdomen support **56** is provided intermediate the entrance and exit gates, as illustrated in FIGS. **3**, **10** and **12**. Abdomen support **56** is comprised of a generally angular elongated beam **58**, having first and second ends, and an elongated, generally vertically disposed support **60**. The support **60** is pivotally connected to beam **58** adjacent the first end thereof. The opposite end of support **60** and the second end of beam **58** are provided with generally U-shaped collars **62** and **62'**, which are adapted to be removably secured to the base **14**. The height of abdomen support **56** is adjusted by operatively engaging support **60** at different angles with respect to base **14**. When support **60** is substantially vertically disposed, abdomen support **56** will be at its maximum height from base **14** to accommodate larger animals. As the angle of support **60** with respect to base **14** is decreased, the height of abdomen support **56** with respect to base **14** will proportionately decrease to support smaller animals.

Base **14** is preferably comprised of a plurality of separate floor panels that are adapted to be removably connected to the lower end of frame **12** so that each such panel may be removed or interchanged. The individual panels are preferably comprised of a plurality of elongated bars **64**, extending transversely to frame **12**, in horizontally spaced relation to one another. It is further preferred that the elongated bars **64** be arranged in vertical spaced relation to one another to form alternating upper and lower traction steps **66** and **68**. The traction steps **66** and **68** provide the animal with the necessary traction to move through the chute in wet or muddy conditions. The removable feature of each base panel allows the operator vary the number of traction steps, if any, along the length of base **14**.

At least one hip-immobilizing arm **70** can be removably secured to one of the sidewalls **20** or **20'**, as illustrated in FIGS. **3**, **10**, **11** and **16**. The immobilizing arm **70** is comprised of an elongated arm **72**, having an engaging member **74** pivotally secured at one end thereof. The opposite end of arm **72** is pivotally secured to a first pin **76** within mounting box **78**. Cylinder **80** is rotatably secured at one end to arm **72** and rotatably secured at its opposite end to a second mounting pin **82** within mounting box **78**. Mounting box **78** is further comprised of a mounting sleeve, which is adapted to removably receive any of the mounting pins **30** along sidewalls **20** or **21'**. Latch **84** is provided adjacent the top of mounting box **78** to releasably secure mounting box **78** to sidewall **20** or **20'**, adjacent the top end thereof. Lever **86** is provided for engaging and releasing latch **84**.

The immobilizing arm **70**, illustrated by FIGS. **9**, **10** and **11**, can be selectively moved between extended and retracted positions. In its extended position, immobilizing arm **70** selectively engages the animal, adjacent the animal's hip for immobilizing the same, FIG. **16**. In the immobilized position, the operator can enter the chute through either of rear access doors **86** or **86'**, illustrated in FIGS. **1**, **10** and **15**, to perform various operations at the rear of the animal. Rear access doors **86** and **86'** are provided with tabs **88** at their lower ends to prevent the doors **86** and **86'** from opening outwardly. Pistons **90** are provided at the upper end of doors **86** and **86'**, which automatically move the doors **86** and **86'** to their closed positions. Once the operator has exited the chute **10** through rear access door **86** or **86'**, immobilizing

arm **70** can be retracted to allow the animal's hip area to freely move transversely with respect to the chute **10**.

An anti-rear device **92** is provided along the top of the chute **10**, adjacent the exit end thereof. It is preferred that the anti-rear device **92** be provided with at least one elongated transverse bar **94** and at least one elongated longitudinal bar **96**. FIGS. **1** and **2** illustrate one embodiment of the anti-rear device **92**, which comprises a single transverse bar **94** extending between the sides of frame **12** and two longitudinal bars **96** extending from the middle of transverse bar **94** to the exit end of frame **12**. This configuration of anti-rear bars prevents the animal from attempting to climb out of the top of the chute **10**.

The movement of entrance gate **14**, exit gate **16**, sidewalls **20** and **20'**, neck stretchers **54** and **54'**, and hip-immobilizing arm **70**, is preferably provided by a hydraulically powered roller chain assembly system **98**, illustrated by FIGS. **4** and **5**. The hydraulic pump is powered by an electric motor or gas engine (not shown), sufficient to generate approximately 700 psi of hydraulic pressure to a valve bank **100**. Hydraulic pressure that is not used is returned to the hydraulic reservoir **102** through a filter head **104**.

The valve bank **100** is comprised of six valves. Six individual levers, displayed on a central control panel **106**, manipulate the valves. For ease of operation, the control panel **106** is disposed at the end of a segmented boom **108**. The boom **108** is pivotally secured to the top of frame **12** so that the operator can move the control panel **106** to any location around the chute **10**.

Entrance gate **16** is moved between open and closed positions through the manipulation of a first lever **110**. By pulling the first lever **110**, a first valve **112** is activated and hydraulic pressure is directed to a cylinder **114**, causing the cylinder **114** to retract. Cylinder **114** is coupled to a vertically disposed roller chain **116**, which extends between two double sprockets **118** and **120**. Double sprockets **118** and **120** are coupled to horizontally disposed roller chains **122** and **124**. Horizontal roller chain **122** is disposed along the top of the chute **10**, adjacent the entrance gate **16**. Horizontal roller chain **124** is disposed along the bottom of the chute **10**, adjacent the entrance gate **16**. As the cylinder **114** retracts, the vertical roller chain **116** rotates double sprockets **118** and **120**, which rotate horizontal roller chains **122** and **124**. Horizontal roller chains **122** and **124** are each connected to L-shaped tabs **36** that guide entrance doors **34** and **34'** between their open and closed positions. Accordingly, as horizontal roller chains **122** and **124** rotate, the entrance gate **16** is moved to its open position. When the first lever **110** is pushed in the opposite direction, the aforementioned cycle is reversed, and the entrance gate **16** is moved to its closed position.

Exit gate **18** is moved between open and closed positions through the manipulation of a second lever **126**. By pulling the second lever **126**, a second valve **128** is activated and hydraulic pressure is directed to cylinder **130**, causing the cylinder **130** to retract. Cylinder **130** is coupled to a vertically disposed roller chain **132**, which extends between double sprockets **134** and **136**. Double sprockets **134** and **136** are coupled to horizontally disposed roller chains **138** and **140**. Horizontal roller chain **138** is disposed along the top of the chute **10**, adjacent the exit gate **18**. Horizontal roller chain **140** is disposed along the bottom of the chute **10**, adjacent the exit gate **18**. As cylinder **130** retracts, vertical roller chain **132** rotates double sprockets **134** and **136**, which rotate horizontal roller chains **138** and **140**. Horizontal roller chains **138** and **140** are each connected to L-shaped tabs **36'** that guide exit doors **48** and **48'** between their open and closed positions. Accordingly, as horizontal roller chains **138** and **140** rotate, the exit gate **18** is moved to its open position. When the second lever **126** is pushed in the opposite direction, the aforementioned cycle is reversed, and the exit gate **18** is moved to its closed position.

The synchronous positioning of opposing sidewalls **20** and **20'** is controlled through the manipulation of a third lever **142**. By pulling the third lever **142**, a third valve **144** is activated and hydraulic pressure is directed to a cylinder **146**, causing the cylinder **146** to retract. Cylinder **146** is coupled to a vertically disposed roller chain **148**, which extends between upper and lower double sprockets **150** and **152**. Double sprockets **150** and **152** are coupled to horizontally disposed roller chains **153** and **155**. The upper double sprocket **150** is pinned to a drive shaft **151** that extends to the right rear corner of chute **10** and is pinned to double sprocket **154**. Vertical roller chain **156** is coupled to double sprocket **154** at one end and double sprocket **158** at the opposite end. Double sprockets **154** and **158** are coupled to horizontally disposed roller chains **160** and **162**. Horizontal roller chains **153**, **155**, **160** and **162** are each connected to a pair of tabs **164** and **164'** that are coupled to opposing sidewalls **20** and **20'**. Accordingly, as the horizontal roller chains rotate, the opposing sidewalls **20** and **20'** are moved outwardly. When the third lever **142** is pushed in the opposite direction, the aforementioned cycle is reversed, and the opposing sidewalls **20** and **20'** are moved inwardly.

By pulling a fourth lever **166**, which is attached to a fourth valve **168**, hydraulic pressure is directed to a fourth cylinder **170**, causing the same to retract. The fourth cylinder **170** is coupled to an arm **172** that is attached to mounting shaft **50**. The retraction of the fourth cylinder **170** causes the mounting shaft **50** to rotate. As described previously, the neck stretchers **54** and **54'** pivot arcably with the rotation of mounting shaft **50**. Accordingly, as the fourth cylinder **170** retracts, neck stretchers **54** and **54'** extend arcably from the chute **10**. When the fourth lever **170** is pushed in the opposite direction, the aforementioned cycle is reversed, and the neck stretchers **54** and **54'** are retracted toward the chute **10**.

By pushing a fifth lever **174**, which is attached to a fifth valve **176**, hydraulic pressure is directed to a fifth cylinder **80**, causing the same to retract. The fifth cylinder **80** is coupled to arm **72** that is hinged in mounting box **78**. As the fifth cylinder **80** retracts, arm **72** extends outwardly into the chute **10**. When the fifth lever **174** is pushed in the opposite direction, the aforementioned cycle is reversed, and the arm **72** is retracted inwardly.

A sixth lever/valve assembly (not pictured) is provided as a spare that can be coupled to any of the cylinders in the event that one of the first through fifth lever/valve assemblies fails mechanically.

It is contemplated that several motive systems, other than a hydraulic chain drive assembly, could be employed by the squeeze chute **10**. For example, the hydraulic pump, valves, and cylinders could readily be replaced with one or more electric or gas powered motors or pneumatic pistons that could be operated by the control panel **106**. Manual power, employed through pivoting or rotary lever arms could also be used in place of the aforementioned power sources.

It is further contemplated that belts, comprised of nearly any material such as metal, rubber, plastic or other synthetic material, could be used in place of the aforementioned roller chains. Alternatively, a simple system of lever arms could be pivotally secured between the aforementioned power

sources and the gates **16** and **18**, opposing sidewalls **20** and **20'**, neck stretchers **54** and **54'**, and immobilizing arm **70**, in place of the previously described roller chains and double sprockets. The opposing sidewalls **20** and **20'** could also be simultaneously operated without drive shaft **151**. In that instance, an additional power source such as a hydraulic cylinder, electric or internal combustion motor, or pneumatic piston, would be coupled with vertical roller chain **156**, or aforementioned alternative.

In the drawings and in the specification, there have been set forth preferred embodiments of the invention and although specific items are employed, these are used in a generic and descriptive sense only and not for purposes of limitation. Changes in the form and proportion of parts, as well as a substitution of equivalents, are contemplated as circumstances may suggest or render expedient without departing from the spirit or scope of the invention as further defined in the following claims.

Thus it can be seen that the invention accomplishes at least all of its stated objectives.

We claim:

1. A device for working livestock, comprising:

an elongated frame having upper and lower ends and entrance and exit ends;

an elongated generally horizontal base; said base being operatively secured to said frame adjacent the lower end thereof;

an entrance gate operatively secured to said frame at said entrance end thereof; said entrance gate being adapted to move between open and closed positions generally transversely with respect to said frame;

an exit gate operatively secured to said frame at said exit end thereof; said exit gate being adapted to move between open and closed positions generally transversely with respect to said frame;

opposing sidewalls operatively movably secured to said frame between the entrance and exit ends thereof; said opposing sidewalls being movable in a generally transverse direction with respect to said frame between open and closed positions; said opposing sidewalls remaining generally parallel to one another as they move between their said open and closed positions;

a first motive means for selectively moving said entrance gate and said exit gate between open and closed positions for selectively immobilizing the fore and aft movement of the livestock; and

a second motive means for selectively moving said opposing sidewalls between open and closed positions for selectively immobilizing the lateral movement of the livestock.

2. The device of claim **1** wherein said first motive means comprises a first hydraulic power assembly operatively coupled to said entrance and exit gates for moving said entrance and exit gates between said open and closed positions.

3. The device of claim **2** wherein said second motive means comprises a second hydraulic power assembly operatively coupled to said opposing sidewalls for moving said opposing sidewalls between said open and closed positions.

4. The device of claim **1** further comprising an elongated control arm, having first and second ends; said first end of said control arm being operatively and pivotally secured to said frame, adjacent the upper end thereof.

5. The device of claim **1** wherein said opposing sidewalls are further comprised of at least one lower panel, having inward and outward facing surfaces, operatively pivotally secured to said opposing sidewalls adjacent the lower end thereof so that said at least one lower panel can be selectively moved between open and closed positions.

6. The device of claim **5** wherein said at least one lower panel is adapted to be selectively secured in said closed position.

7. The device of claim **5** wherein said inward facing surface of said at least one lower panel is substantially planar to prevent livestock within the device from using said at least one lower panel as a foothold.

8. The device of claim **1** wherein said opposing sidewalls are further comprised of at least one upper panel pivotally secured adjacent the upper end of said opposing sidewalls so that said at least one upper panel can be selectively moved between open and closed positions.

9. The device of claim **8** wherein said at least one upper panel is adapted to be selectively secured in said closed position.

10. The device of claim **8** wherein said at least one upper panel is adapted to be selectively removed from said opposing sidewalls.

11. The device of claim **8** wherein at least one opening is formed in said at least one upper panel to allow an operator access to the livestock therethrough.

12. The device of claim **11** further comprising at least one generally elongated flap operatively secured to said at least one upper panel to selectively cover said at least one opening in said at least one upper panel.

13. The device of claim **1** further comprising an anti-rear member, operatively secured to the frame closely adjacent the upper end thereof; said anti-rear member being adapted to prevent livestock within the device from exiting the device through the upper end thereof.

14. The device of claim **1** wherein said base is further comprised of at least one generally planar floor panel; said at least one floor panel being adapted to operatively removably engage the frame adjacent the lower end thereof so that said at least one floor panel may be removed or interchanged.

15. The device of claim **1** wherein said base is further comprised of a plurality of elongated bars operatively secured to the lower end of said frame in a generally horizontally spaced relation to one another; said bars extending transversely with respect to said frame.

16. The device of claim **1** further comprising at least one elongated access door operatively pivotally secured to one of said opposing sidewalls; said at least one elongated access door being adapted to pivot about a generally vertical axis between open and closed positions.

17. The device of claim **1** wherein each of said opposing sidewalls is further comprised of at least one elongated access door operatively pivotally secured thereto; said at least one elongated access door being adapted to pivot about a generally vertical axis between open and closed positions.

18. The device of claim **1** further comprising at least one generally elongated neck extender having first and second ends; said first end of said at least one neck extender being operatively pivotally coupled to said frame adjacent said exit end thereof; said at least one neck extender being adapted to selectively, arcably pivot outwardly from said entrance end from its first end to engage the head and neck of the animal to secure the same.

19. The device of claim **18** further comprising a hydraulic assembly; said hydraulic assembly being operatively secured to said at least one neck extender for selectively pivoting said at least one neck extender between extended and retracted positions.

20. The device of claim **1** further comprising at least one generally elongated hip immobilizing member operatively removably secured to one of said opposing sidewalls; said at least one hip immobilizing member being adapted to be moved between extended and retracted positions to selectively restrict lateral movement of the livestock proximal its hip area.

21. A device for working livestock, comprising:

an elongated frame having upper and lower ends and entrance and exit ends;

an elongated generally horizontal base; said base being operatively secured to said frame adjacent the lower end thereof;

an entrance gate operatively secured to said frame at said entrance end thereof; said entrance gate being adapted to move between open and closed positions generally transversely with respect to said frame;

an exit gate operatively secured to said frame at said exit end thereof; said exit gate being adapted to move between open and closed positions generally transversely with respect to said frame;

opposing sidewalls operatively movably secured to said frame between the entrance and exit ends thereof; said opposing sidewalls being movable in a generally transverse direction with respect to said frame between open and closed positions; said opposing sidewalls remaining generally parallel to one another as they move between their said open and closed positions;

a first motive means for selectively moving said entrance gate and said exit gate between open and closed positions for selectively immobilizing the fore and aft movement of the livestock;

a second motive means for selectively moving said opposing sidewalls between open and closed positions for selectively immobilizing the lateral movement of the livestock;

an elongated control arm, having first and second ends; said first end of said control arm being operatively and pivotally secured to said frame, adjacent the upper end thereof; and

at least one controller operatively coupled to said control arm, closely adjacent the second end thereof; said controller being adapted to selectively actuate said first and second motive means.

22. The device of claim **4** wherein said controller arm is further comprised of a plurality of generally elongated segments operatively and pivotally coupled to one another so that said second end of said controller arm is selectively positionable around the frame.

23. The device of claim **21** wherein said first motive means is comprised of a hydraulic power assembly, having at least one hydraulic cylinder, operatively connected to said at least one controller.

24. The device of claim **23** further comprising a first roller chain assembly operatively connecting said hydraulic power assembly to said entrance gate for selectively moving said entrance gate between open and closed positions.

25. The device of claim **7** further comprising a second roller chain assembly operatively connecting said hydraulic power assembly to said exit gate for selectively moving said exit gate between open and closed positions.

26. The device of claim **21** wherein said second motive means is comprised of a hydraulic power assembly, having at least one hydraulic cylinder, operatively connected to said at least one controller.

27. The device of claim **26** further comprising a roller chain assembly operatively connecting said hydraulic power assembly to said opposing sidewalls for selectively moving said opposing sidewalls between open and closed positions.

28. A device for working livestock, comprising:

an elongated frame having upper and lower ends and entrance and exit ends;

an elongated generally horizontal base; said base being operatively secured to said frame adjacent the lower end thereof;

an entrance gate operatively secured to said frame at said entrance end thereof; said entrance gate being adapted to move between open and closed positions generally transversely with respect to said frame; an exit gate operatively secured to said frame at said exit end thereof; said

exit gate being adapted to move between open and closed positions generally

transversely with respect to said frame;

opposing sidewalls operatively movably secured to said frame between the entrance and exit ends thereof; said opposing sidewalls being movable in a generally transverse direction with respect to said frame between open and closed positions; said opposing sidewalls remaining generally parallel to one another as they move between their said open and closed positions;

a first motive means for selectively moving said entrance gate and said exit gate between open and closed positions for selectively immobilizing the fore and aft movement of the livestock;

a second motive means for selectively moving said opposing sidewalls between open and closed positions for selectively immobilizing the lateral movement of the livestock; and

an elongated abdomen support, having upper and lower ends, operatively secured to the base in longitudinal relation thereto.

29. The device of claim **28** wherein said abdomen support is comprised of a generally angular, elongated beam, having first and second ends, and an elongated support operatively secured to said beam adjacent the first end thereof.

30. The device of claim **29** wherein said support is operatively pivotally secured to said beam so that the height of said abdomen support with respect to said base can be selectively adjusted.

31. The device of claim **30** wherein said base is comprised of a plurality of generally elongated, horizontally spaced, transversely disposed floor rods.

32. The device of claim **31** wherein said abdomen support is further comprised of at least one generally U-shaped bracket disposed adjacent the lower end of said abdomen support; said at least one U-shaped bracket being adapted to operatively removably receive at least one of said floor rods.

33. A device for working livestock, comprising:

an elongated frame having upper and lower ends and entrance and exit ends;

an elongated generally horizontal base having a plurality of elongated bars operatively secured to the lower end of said frame in a generally horizontally spaced relation to one another; said bars extending transversely with respect to said frame; said plurality of elongated bars being arranged in a generally vertically spaced relation to one another to form alternating upper and lower traction steps for the livestock within the device; said base being operatively secured to said frame adjacent the lower end thereof;

an entrance gate operatively secured to said frame at said entrance end thereof; said entrance gate being adapted

to move between open and closed positions generally transversely with respect to said frame;

an exit gate operatively secured to said frame at said exit end thereof; said exit gate being adapted to move between open and closed positions generally transversely with respect to said frame;

opposing sidewalls operatively movably secured to said frame between the entrance and exit ends thereof; said opposing sidewalls being movable in a generally transverse direction with respect to said frame between open and closed positions; said opposing sidewalls remaining generally parallel to one another as they move between their said open and closed positions;

a first motive means for selectively moving said entrance gate and said exit gate between open and closed positions for selectively immobilizing the fore and aft movement of the livestock; and

a second motive means for selectively moving said opposing sidewalls between open and closed positions for selectively immobilizing the lateral movement of the livestock.

34. The device of claim **20** further comprising a hydraulic assembly for selectively moving said at least one hip immobilizing member between extended and retracted positions.

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